FIG.1(a)

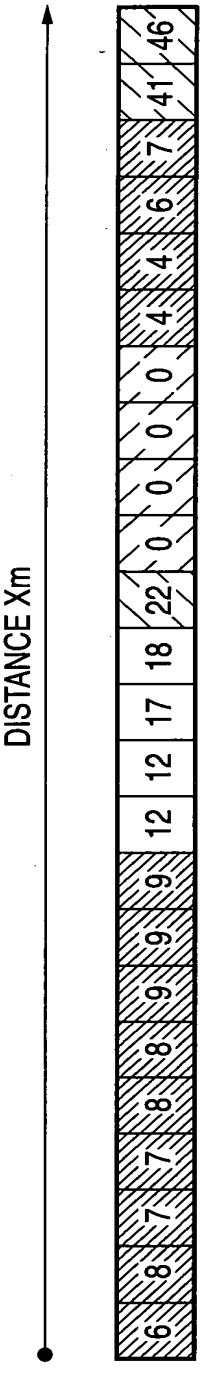
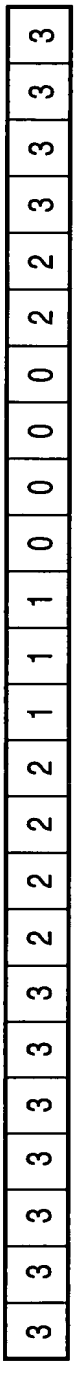


FIG.1(b)



BEST AVAILABLE COPY

FIG. 2(a)

(RELIABILITY DISPLAYED IN WATERMARK)

HIGH RELIABILITY
(SOLID LINE WITHOUT WATERMARK)

MEDIUM RELIABILITY
(SMALL TRANSMITTANCE : TRANSMITTANCE OF 33% IN THIS EXAMPLE)

LOW RELIABILITY (LARGE TRANSMITTANCE: TRANSMITTANCE OF 66% IN THIS EXAMPLE)

NO LINES UNKNOWN

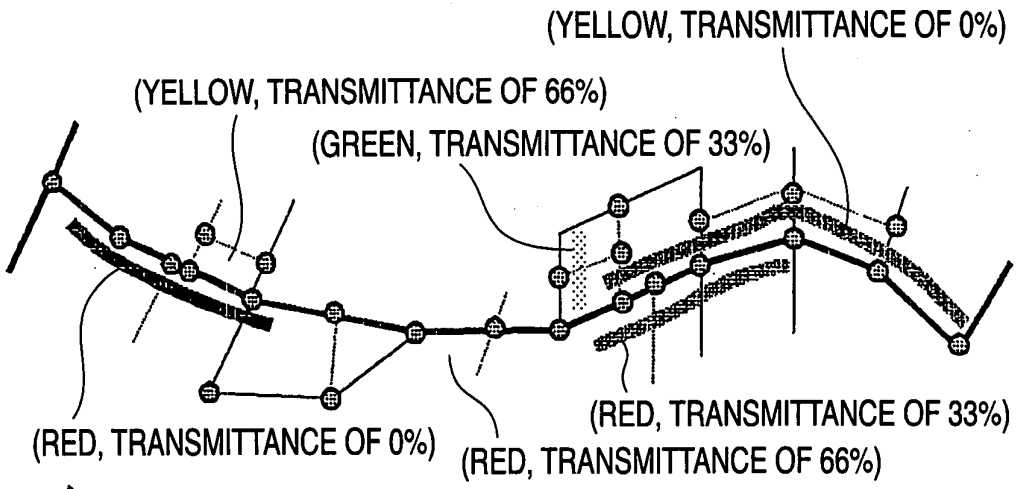


FIG. 2(b)

(RELIABILITY DISPLAYED IN LINE WIDTH)

HIGH RELIABILITY (BALD LINE)

MEDIUM RELIABILITY (MEDIUM-BOLD LINE)

LOW RELIABILITY (FINE LINE)

NO LINES UNKNOWN

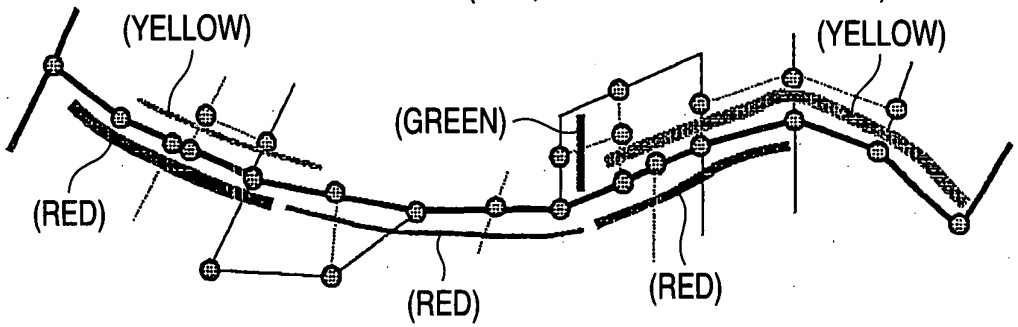


FIG. 2(c)

(RELIABILITY DISPLAYED IN DASHED LINE)

HIGH RELIABILITY (SOLID LINE)

MEDIUM RELIABILITY (LONG DASHED LINE)

LOW RELIABILITY (SHORT DASHED LINE)

NO LINES UNKNOWN

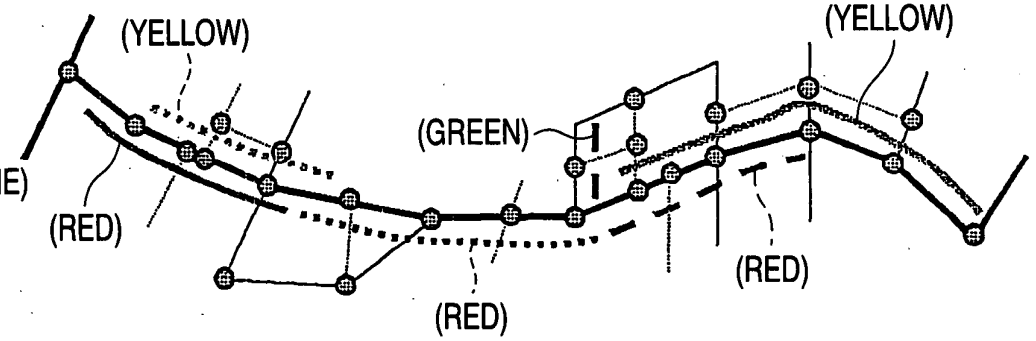


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FIG. 3

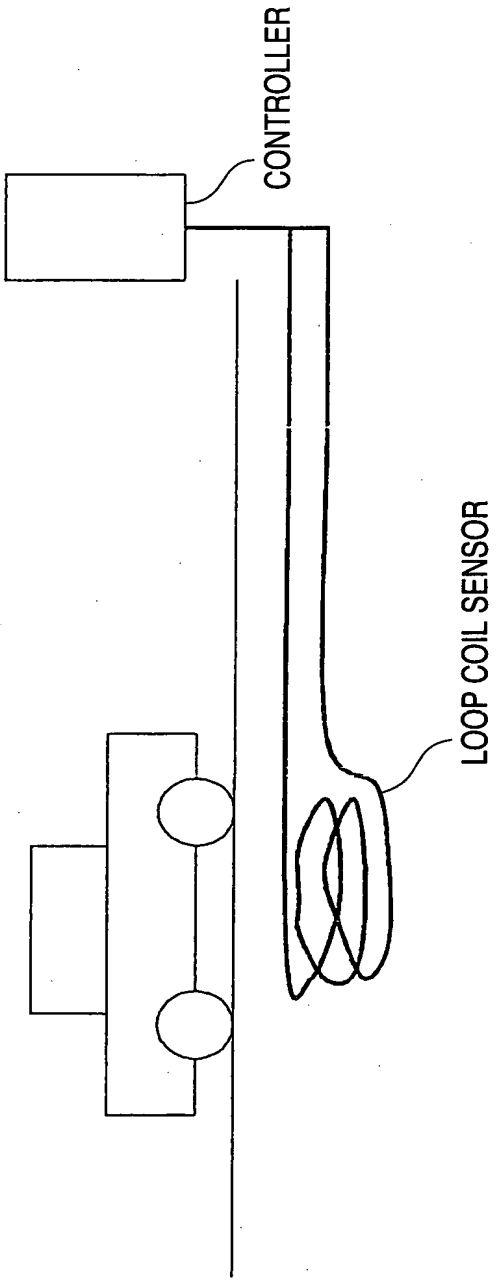

FIG. 4

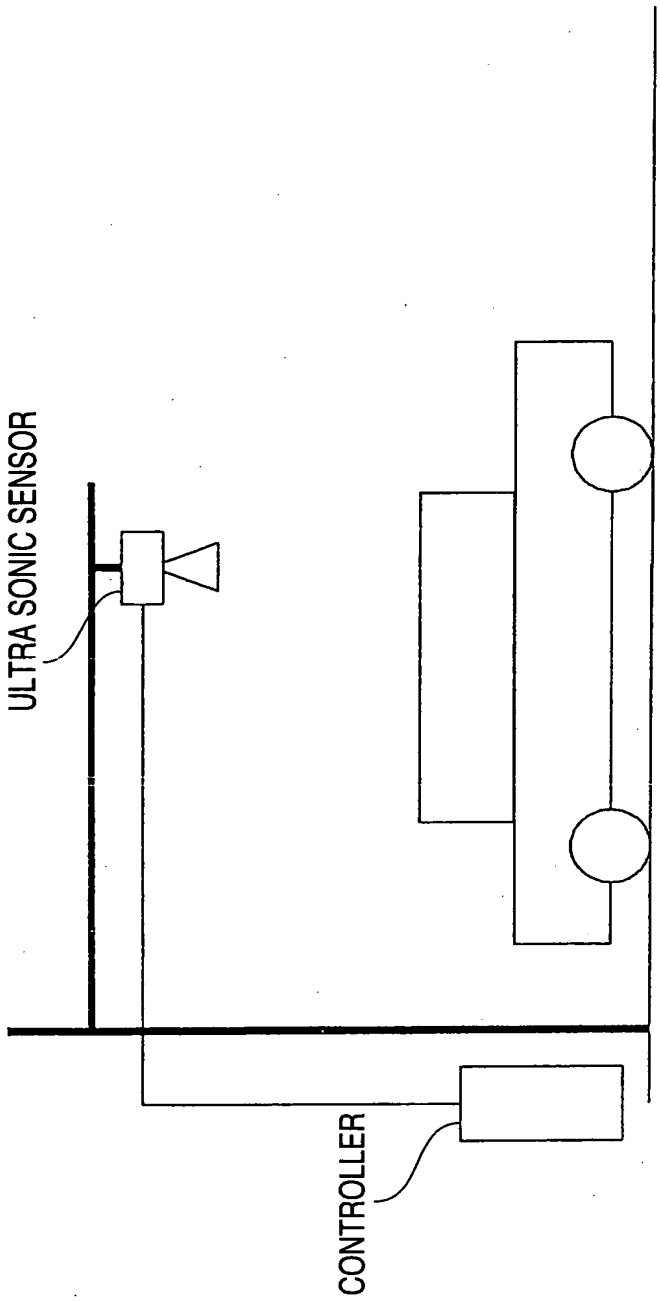

FIG. 5

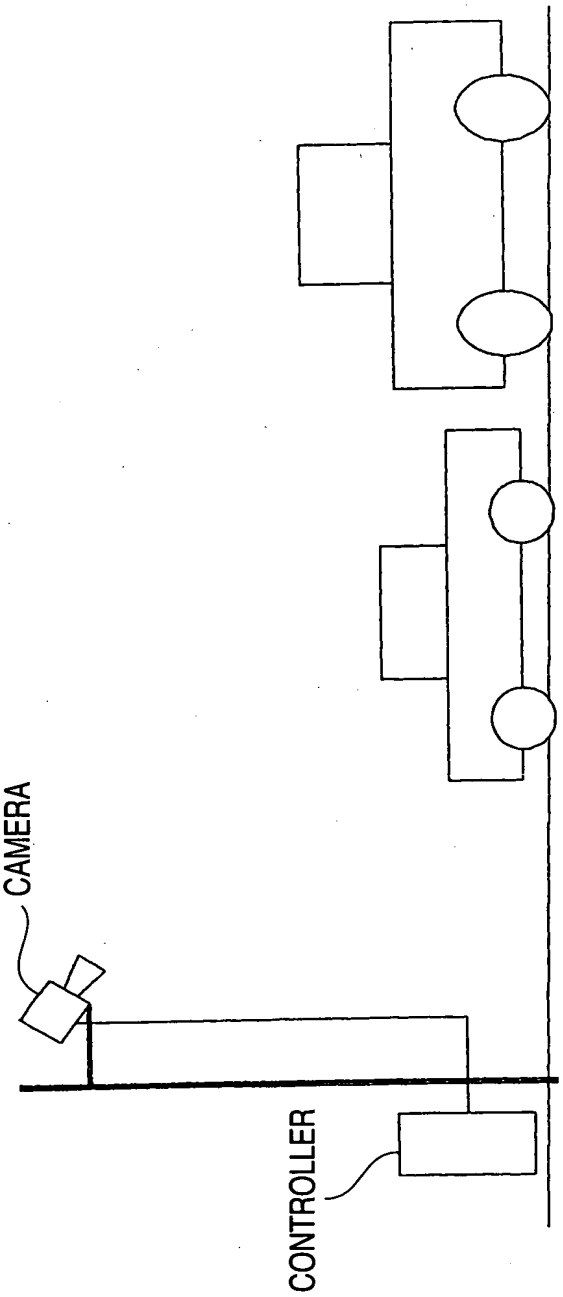

FIG. 6

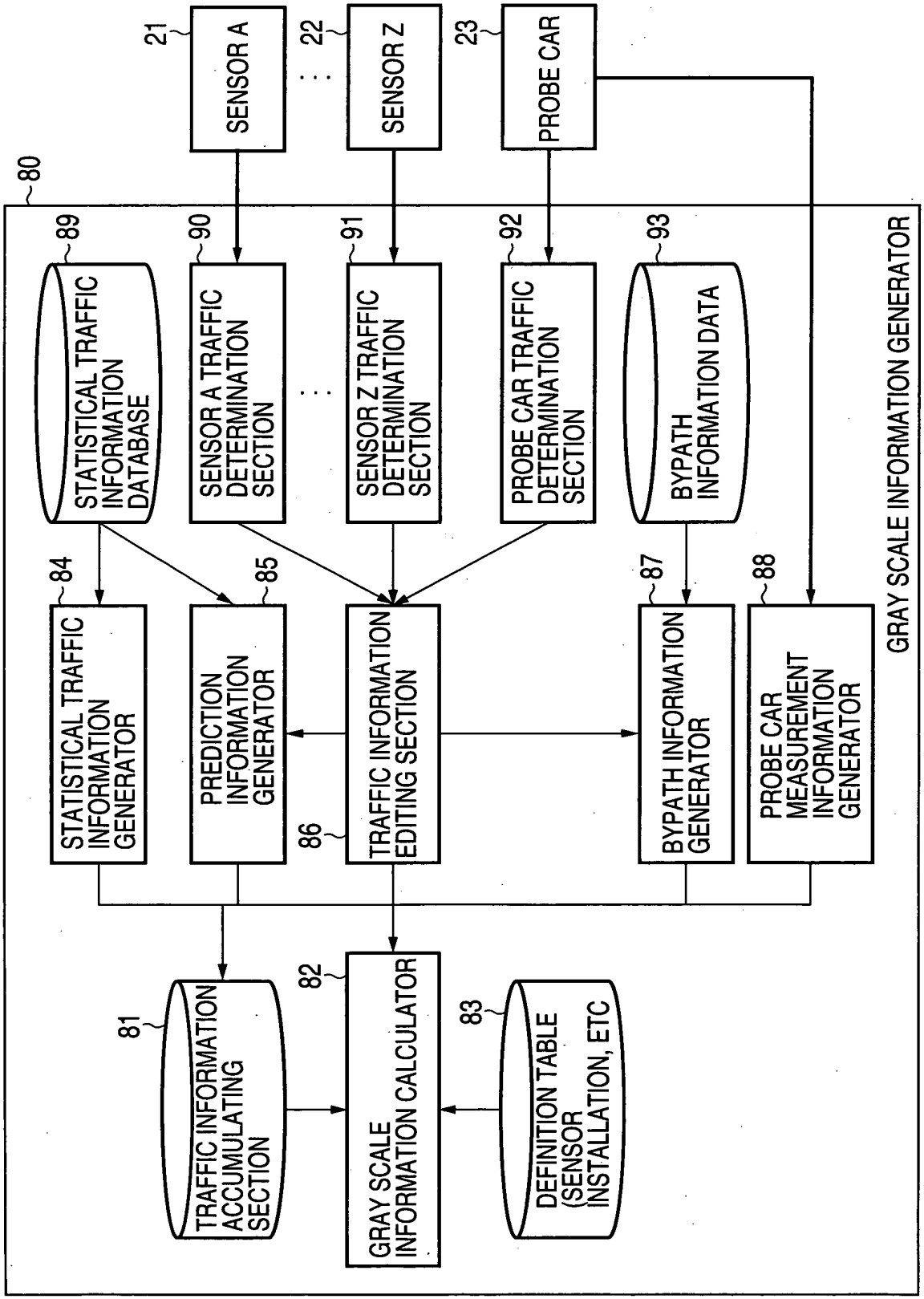
21
SENSOR A
22
SENSOR Z
23
PROBE CAR
80
89
STATISTICAL TRAFFIC INFORMATION DATABASE
90
SENSOR A TRAFFIC DETERMINATION SECTION
91
SENSOR Z TRAFFIC DETERMINATION SECTION
92
PROBE CAR TRAFFIC DETERMINATION SECTION
93
BYPATH INFORMATION DATA
84
STATISTICAL TRAFFIC INFORMATION GENERATOR
85
PREDICTION INFORMATION GENERATOR
86
TRAFFIC INFORMATION EDITING SECTION
87
BYPATH INFORMATION GENERATOR
88
PROBE CAR MEASUREMENT INFORMATION GENERATOR
81
TRAFFIC INFORMATION ACCUMULATING SECTION
82
GRAY SCALE INFORMATION CALCULATOR
83
DEFINITION TABLE (SENSOR INSTALLATION, ETC
GRAY SCALE INFORMATION GENERATOR

FIG. 7

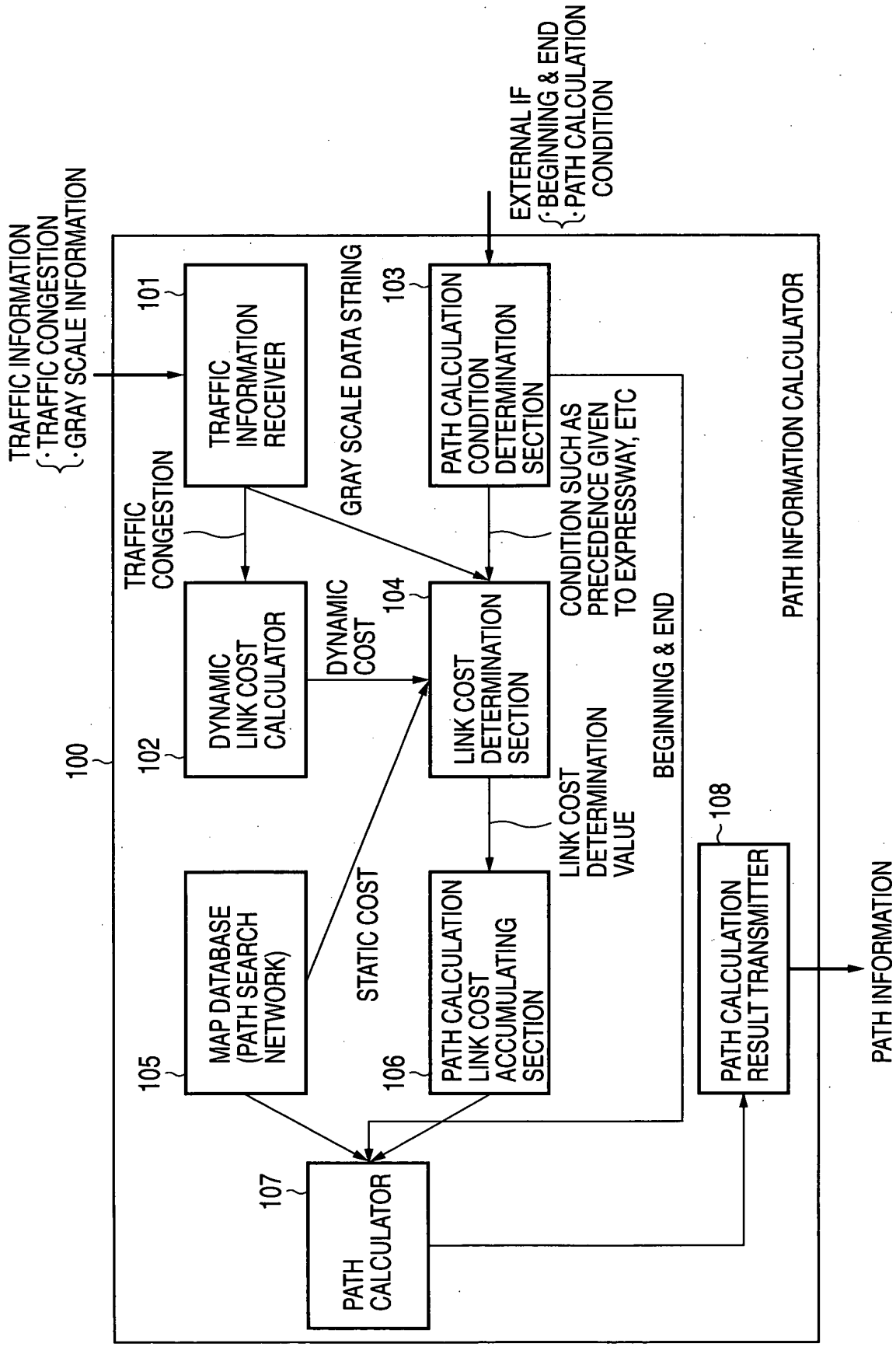
TRAFFIC INFORMATION
·TRAFFIC CONGESTION
·GRAY SCALE INFORMATION
EXTERNAL IF
·BEGINNING & END
·PATH CALCULATION CONDITION
100
101
TRAFFIC INFORMATION RECEIVER
103
PATH CALCULATION CONDITION DETERMINATION SECTION
GRAY SCALE DATA STRING
TRAFFIC CONGESTION
CONDITION SUCH AS PRECEDENCE GIVEN TO EXPRESSWAY, ETC
102
DYNAMIC LINK COST CALCULATOR
DYNAMIC COST
104
LINK COST DETERMINATION SECTION
BEGINNING & END
PATH INFORMATION CALCULATOR
LINK COST DETERMINATION VALUE
108
105
MAP DATABASE (PATH SEARCH NETWORK)
STATIC COST
106
PATH CALCULATION LINK COST ACCUMULATING SECTION
PATH CALCULATION RESULT TRANSMITTER
PATH INFORMATION
107
PATH CALCULATOR

FIG. 8

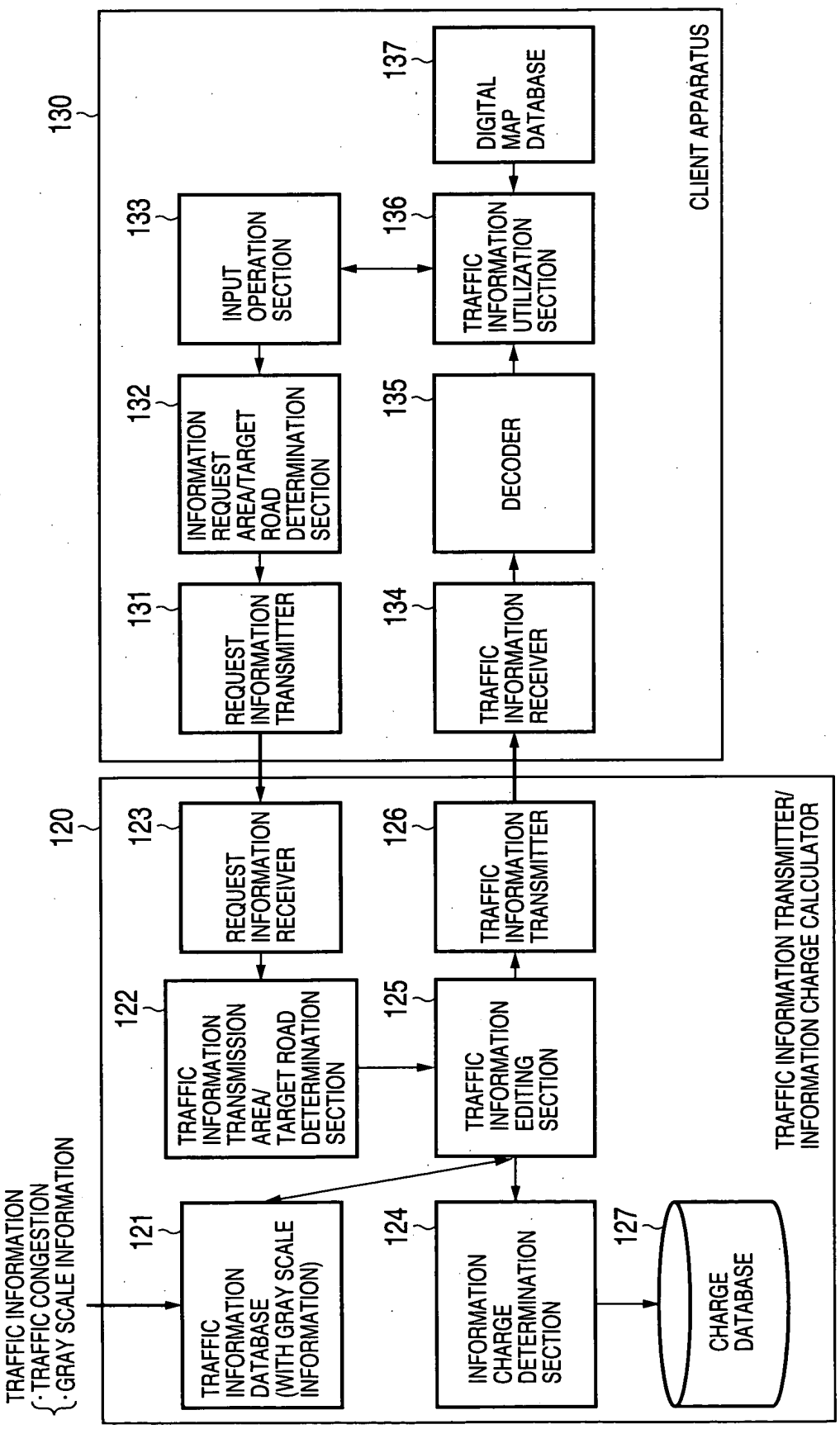
TRAFFIC INFORMATION
·TRAFFIC CONGESTION
·GRAY SCALE INFORMATION
120
TRAFFIC INFORMATION TRANSMITTER/
INFORMATION CHARGE CALCULATOR
121
TRAFFIC INFORMATION DATABASE (WITH GRAY SCALE INFORMATION)
122
TRAFFIC INFORMATION TRANSMISSION AREA/ TARGET ROAD DETERMINATION SECTION
123
REQUEST INFORMATION RECEIVER
124
INFORMATION CHARGE DETERMINATION SECTION
125
TRAFFIC INFORMATION EDITING SECTION
126
TRAFFIC INFORMATION TRANSMITTER
127
CHARGE DATABASE
130
CLIENT APPARATUS
131
REQUEST INFORMATION TRANSMITTER
132
INFORMATION REQUEST AREA/TARGET ROAD DETERMINATION SECTION
133
INPUT OPERATION SECTION
134
TRAFFIC INFORMATION RECEIVER
135
DECODER
136
TRAFFIC INFORMATION UTILIZATION SECTION
137
DIGITAL MAP DATABASE

FIG. 9

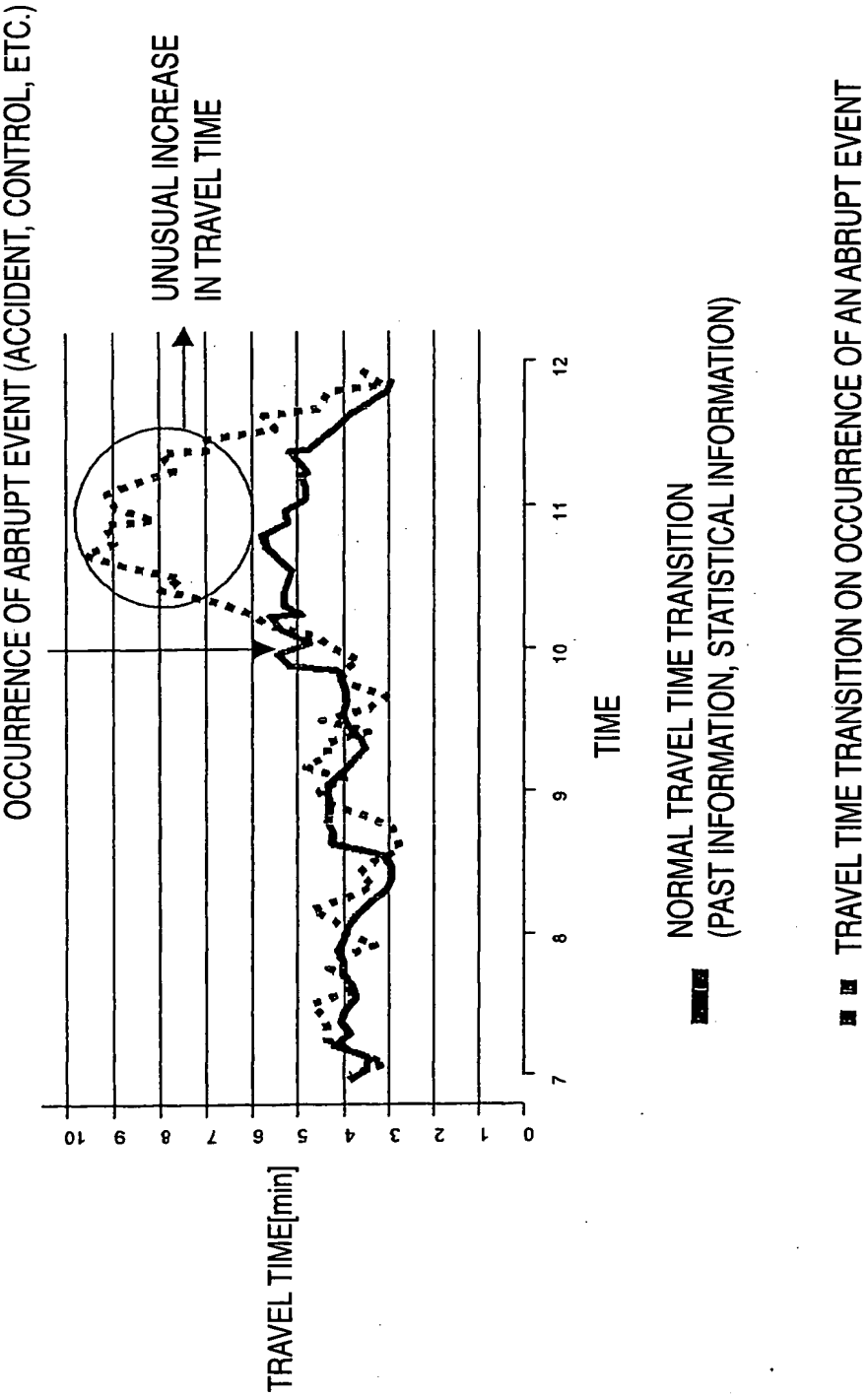
OCCURRENCE OF ABRUPT EVENT (ACCIDENT, CONTROL, ETC.)
UNUSUAL INCREASE IN TRAVEL TIME
TRAVEL TIME[min]
0
1
2
3
4
5
6
7
8
9
10
7
8
9
10
11
12
TIME
NORMAL TRAVEL TIME TRANSITION (PAST INFORMATION, STATISTICAL INFORMATION)
TRAVEL TIME TRANSITION ON OCCURRENCE OF AN ABRUPT EVENT

FIG. 10

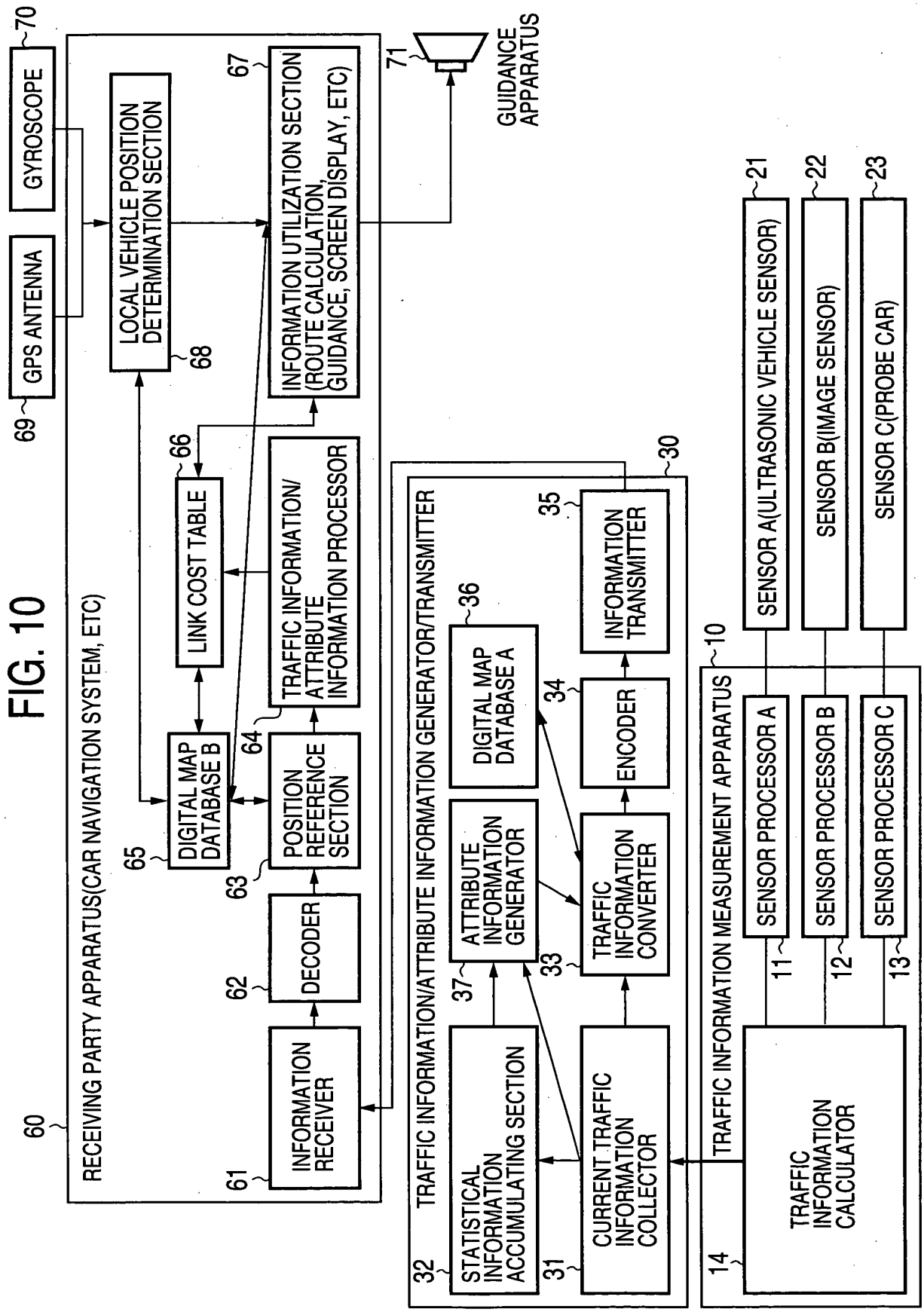
RECEIVING PARTY APPARATUS(CAR NAVIGATION SYSTEM, ETC)
60
GPS ANTENNA
69
GYROSCOPE
70
LOCAL VEHICLE POSITION DETERMINATION SECTION
68
INFORMATION UTILIZATION SECTION (ROUTE CALCULATION, GUIDANCE, SCREEN DISPLAY, ETC)
67
71
GUIDANCE APPARATUS
LINK COST TABLE
66
TRAFFIC INFORMATION/ ATTRIBUTE INFORMATION PROCESSOR
64
DIGITAL MAP DATABASE B
65
POSITION REFERENCE SECTION
63
DECODER
62
INFORMATION RECEIVER
61
TRAFFIC INFORMATION/ATTRIBUTE INFORMATION GENERATOR/TRANSMITTER
30
DIGITAL MAP DATABASE A
36
INFORMATION TRANSMITTER
35
ENCODER
34
ATTRIBUTE INFORMATION GENERATOR
37
TRAFFIC INFORMATION CONVERTER
33
STATISTICAL INFORMATION ACCUMULATING SECTION
32
CURRENT TRAFFIC INFORMATION COLLECTOR
31
TRAFFIC INFORMATION MEASUREMENT APPARATUS
10
SENSOR A(ULTRASONIC VEHICLE SENSOR)
21
SENSOR B(IMAGE SENSOR)
22
SENSOR C(PROBE CAR)
23
SENSOR PROCESSOR A
11
SENSOR PROCESSOR B
12
SENSOR PROCESSOR C
13
TRAFFIC INFORMATION CALCULATOR
14

FIG.11

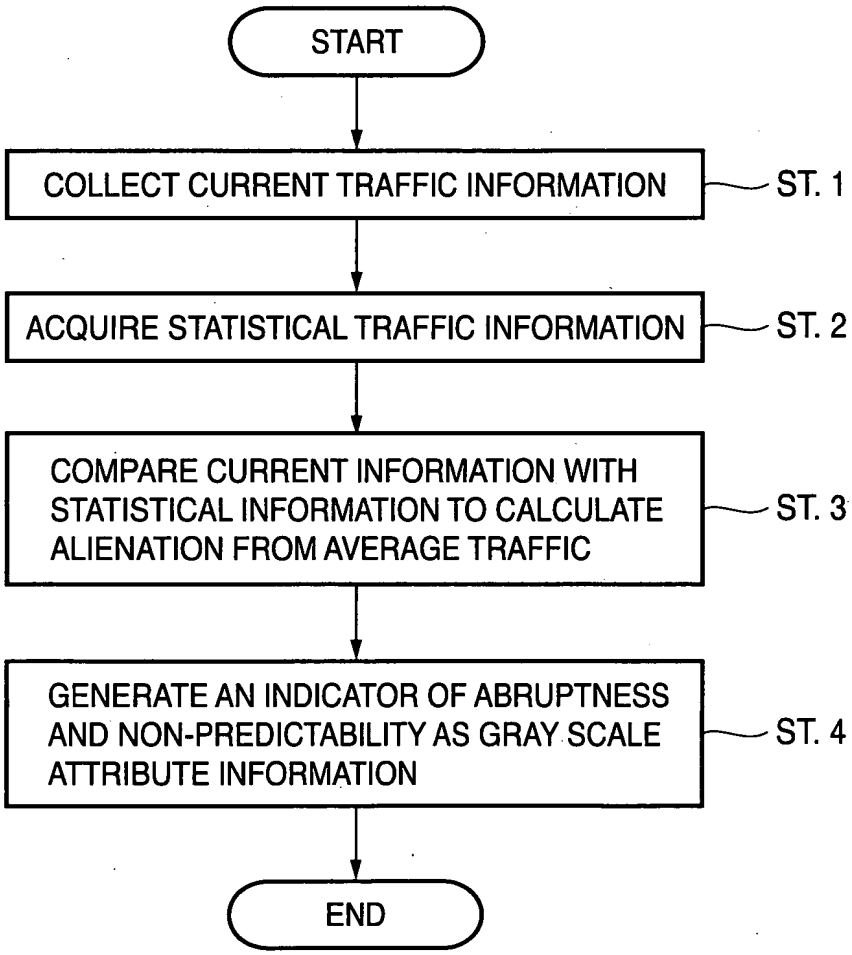
START
COLLECT CURRENT TRAFFIC INFORMATION
ST. 1
ACQUIRE STATISTICAL TRAFFIC INFORMATION
ST. 2
COMPARE CURRENT INFORMATION WITH STATISTICAL INFORMATION TO CALCULATE ALIENATION FROM AVERAGE TRAFFIC
ST. 3
GENERATE AN INDICATOR OF ABRUPTNESS AND NON-PREDICTABILITY AS GRAY SCALE ATTRIBUTE INFORMATION
ST. 4
END

FIG. 12

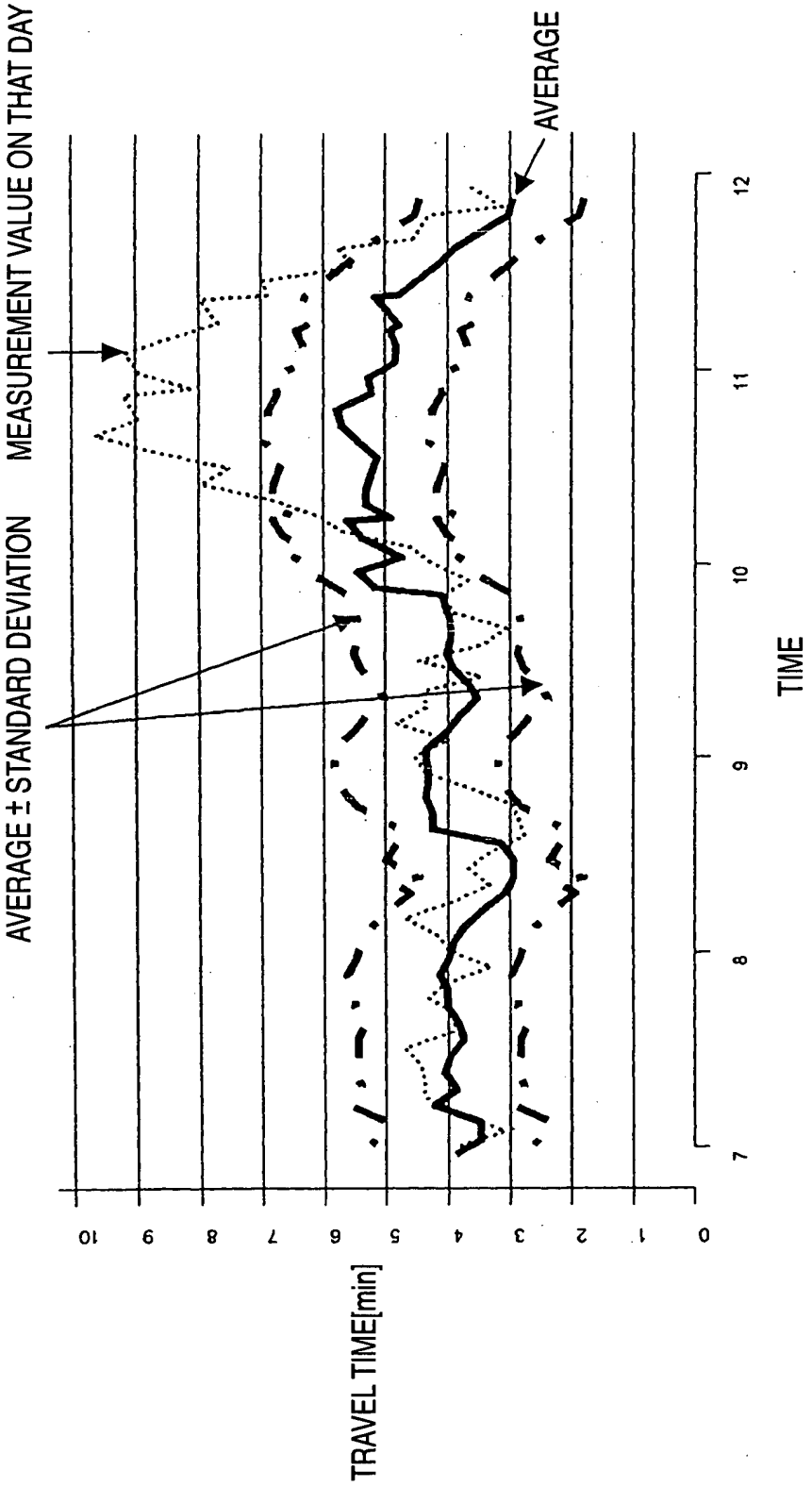
AVERAGE ± STANDARD DEVIATION
MEASUREMENT VALUE ON THAT DAY
AVERAGE
TRAVEL TIME[min]
0
1
2
3
4
5
6
7
8
9
10
TIME
7
8
9
10
11
12

FIG. 13 (a)

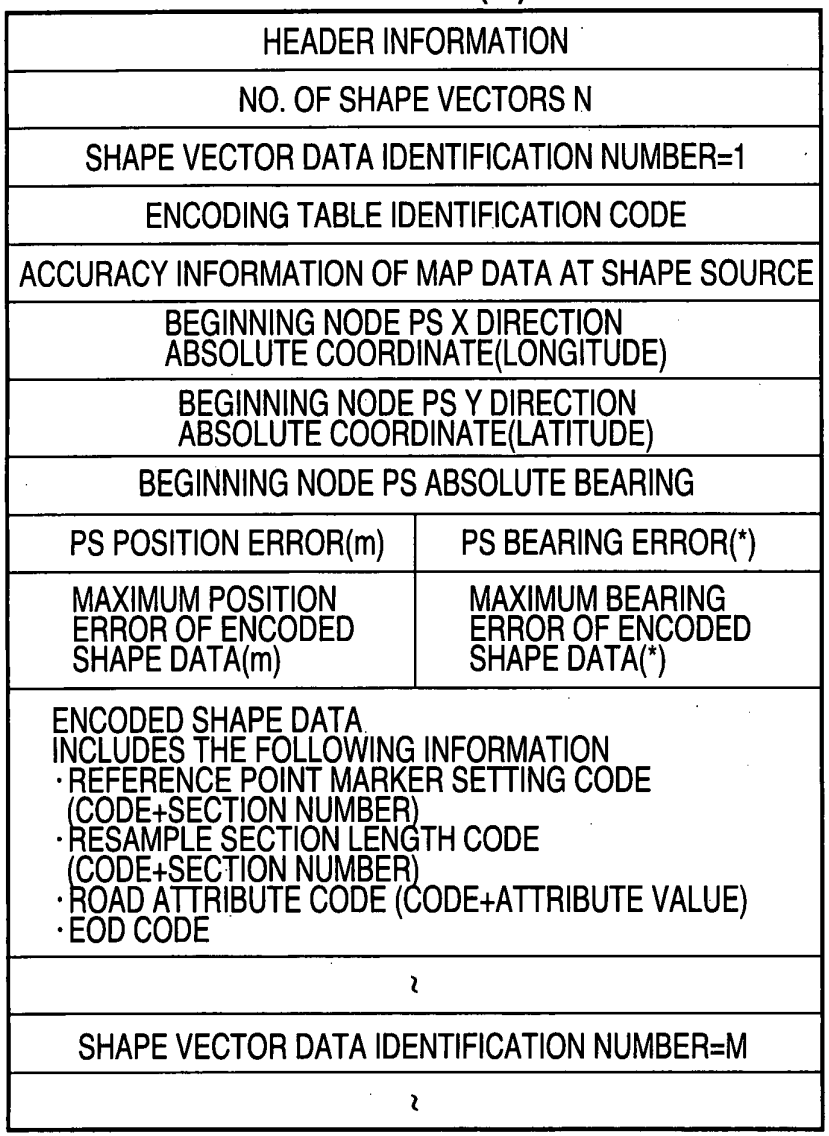

FIG. 13 (b)

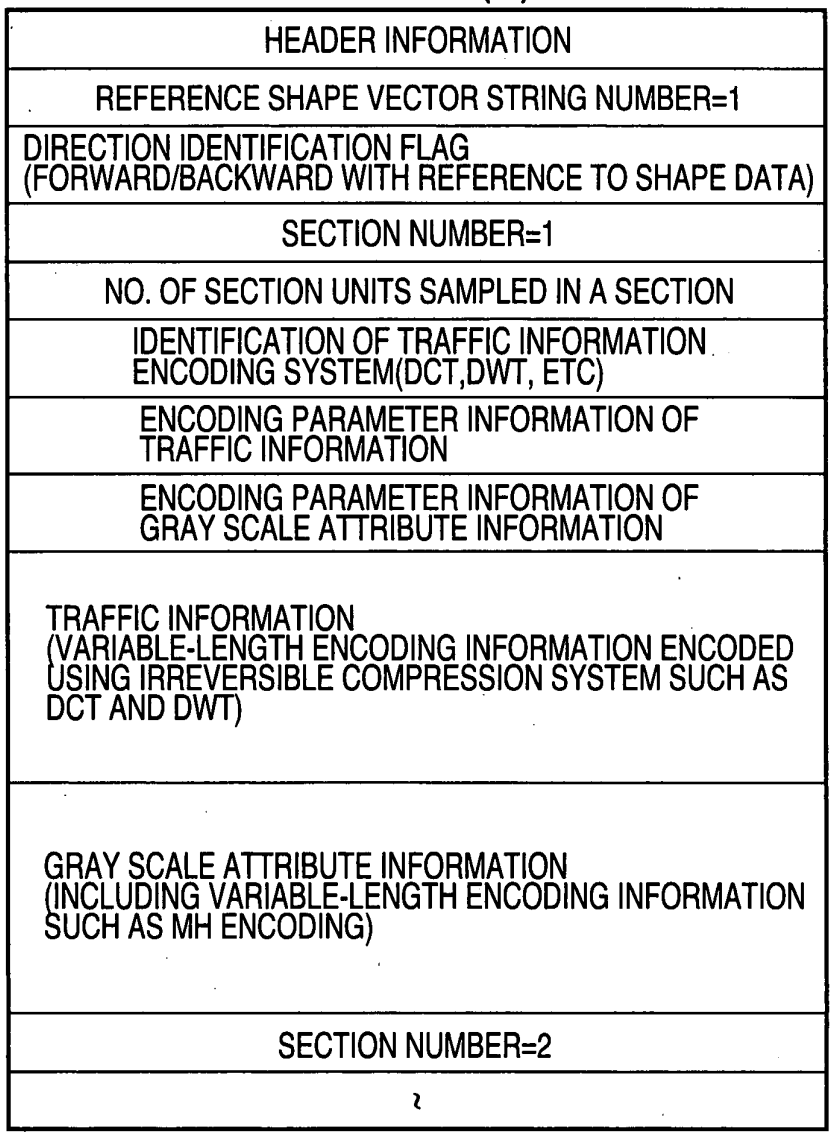

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FIG. 14

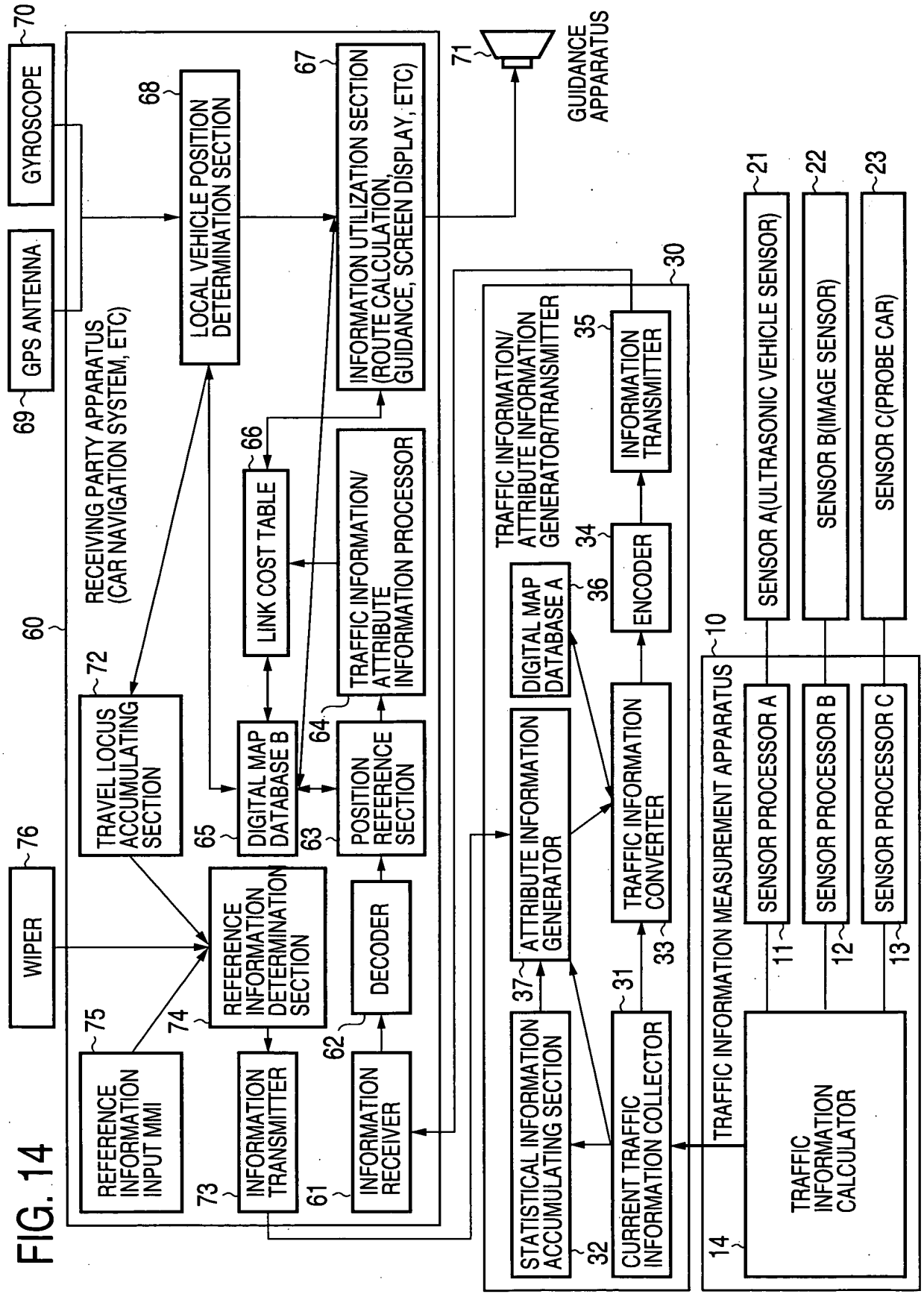
RECEIVING PARTY APPARATUS (CAR NAVIGATION SYSTEM, ETC)
60
GYROSCOPE
70
GPS ANTENNA
69
LOCAL VEHICLE POSITION DETERMINATION SECTION
68
INFORMATION UTILIZATION SECTION (ROUTE CALCULATION, GUIDANCE, SCREEN DISPLAY, ETC)
67
71
GUIDANCE APPARATUS
LINK COST TABLE
66
TRAFFIC INFORMATION/ ATTRIBUTE INFORMATION PROCESSOR
64
TRAVEL LOCUS ACCUMULATING SECTION
72
DIGITAL MAP DATABASE B
65
POSITION REFERENCE SECTION
63
WIPER
76
REFERENCE INFORMATION DETERMINATION SECTION
74
DECODER
62
REFERENCE INFORMATION INPUT MMI
75
INFORMATION TRANSMITTER
73
INFORMATION RECEIVER
61
TRAFFIC INFORMATION/ ATTRIBUTE INFORMATION GENERATOR/TRANSMITTER
30
DIGITAL MAP DATABASE A
36
ENCODER
34
INFORMATION TRANSMITTER
35
ATTRIBUTE INFORMATION GENERATOR
37
TRAFFIC INFORMATION CONVERTER
31
STATISTICAL INFORMATION ACCUMULATING SECTION
32
CURRENT TRAFFIC INFORMATION COLLECTOR
33
TRAFFIC INFORMATION MEASUREMENT APPARATUS
10
SENSOR PROCESSOR A
11
SENSOR PROCESSOR B
12
SENSOR PROCESSOR C
13
TRAFFIC INFORMATION CALCULATOR
14
SENSOR A(ULTRASONIC VEHICLE SENSOR)
21
SENSOR B(IMAGE SENSOR)
22
SENSOR C(PROBE CAR)
23

FIG.15

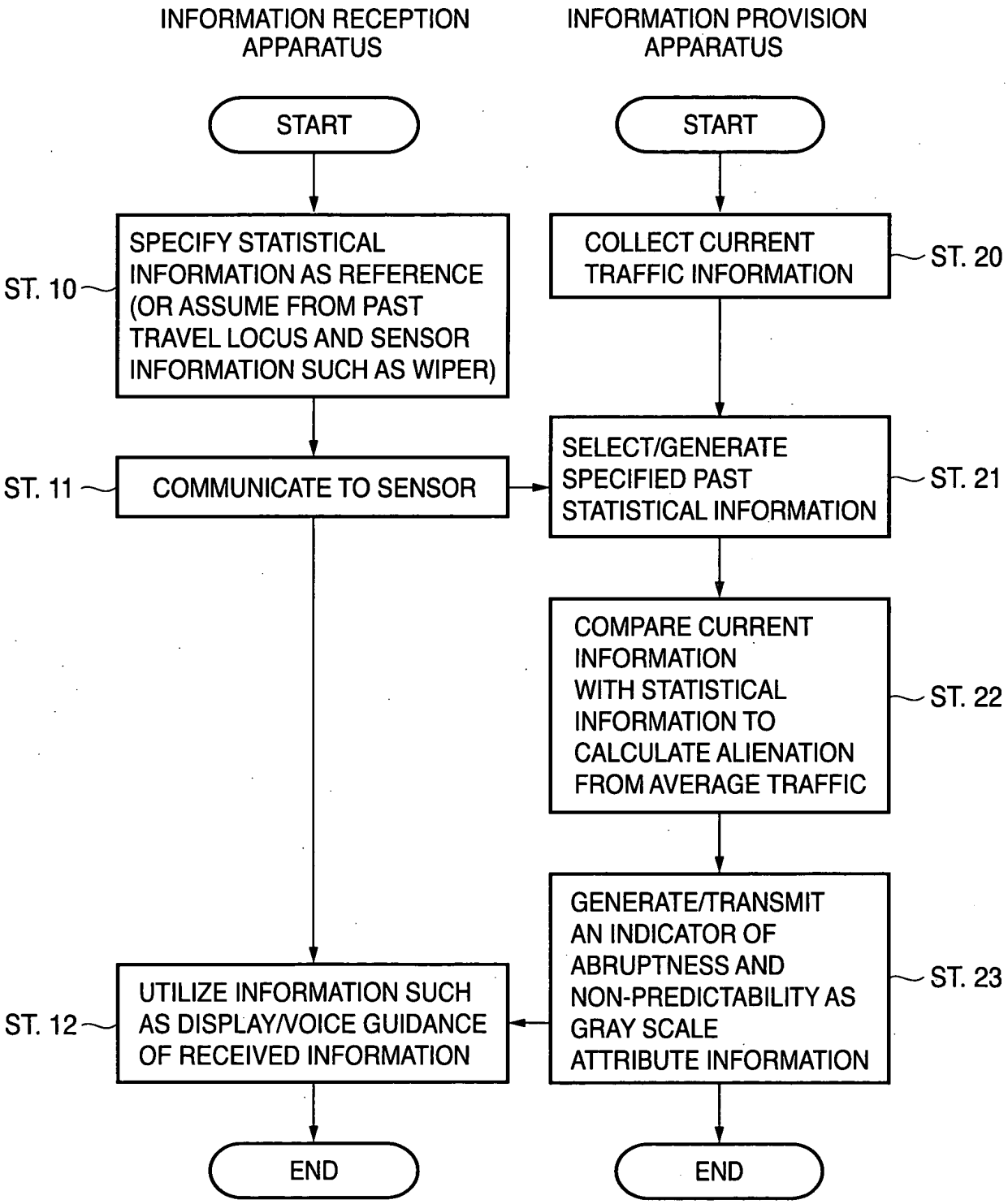
INFORMATION RECEPTION APPARATUS
INFORMATION PROVISION APPARATUS
START
START
SPECIFY STATISTICAL INFORMATION AS REFERENCE (OR ASSUME FROM PAST TRAVEL LOCUS AND SENSOR INFORMATION SUCH AS WIPER)
ST. 10
COLLECT CURRENT TRAFFIC INFORMATION
ST. 20
ST. 11
COMMUNICATE TO SENSOR
SELECT/GENERATE SPECIFIED PAST STATISTICAL INFORMATION
ST. 21
COMPARE CURRENT INFORMATION WITH STATISTICAL INFORMATION TO CALCULATE ALIENATION FROM AVERAGE TRAFFIC
ST. 22
GENERATE/TRANSMIT AN INDICATOR OF ABRUPTNESS AND NON-PREDICTABILITY AS GRAY SCALE ATTRIBUTE INFORMATION
ST. 23
ST. 12
UTILIZE INFORMATION SUCH AS DISPLAY/VOICE GUIDANCE OF RECEIVED INFORMATION
END
END

FIG. 16

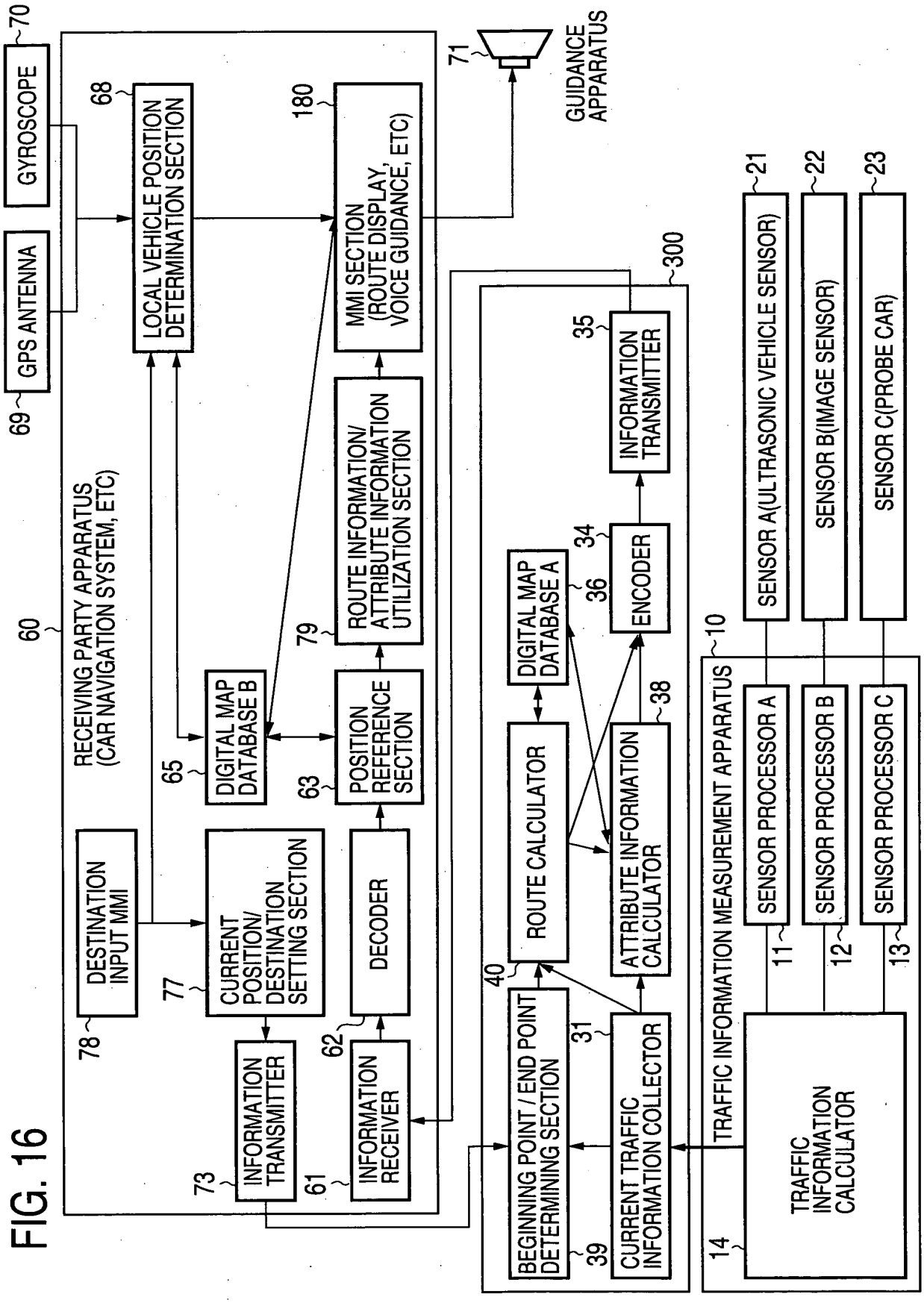
RECEIVING PARTY APPARATUS (CAR NAVIGATION SYSTEM, ETC)
60
GYROSCOPE
70
GPS ANTENNA
69
LOCAL VEHICLE POSITION DETERMINATION SECTION
68
MMI SECTION (ROUTE DISPLAY, VOICE GUIDANCE, ETC)
180
GUIDANCE APPARATUS
71
DESTINATION INPUT MMI
78
CURRENT POSITION/ DESTINATION SETTING SECTION
77
DIGITAL MAP DATABASE B
65
POSITION REFERENCE SECTION
63
ROUTE INFORMATION/ ATTRIBUTE INFORMATION UTILIZATION SECTION
79
INFORMATION TRANSMITTER
73
INFORMATION RECEIVER
61
DECODER
62
BEGINNING POINT / END POINT DETERMINING SECTION
39
CURRENT TRAFFIC INFORMATION COLLECTOR
31
ROUTE CALCULATOR
40
DIGITAL MAP DATABASE A
36
ATTRIBUTE INFORMATION CALCULATOR
38
ENCODER
34
INFORMATION TRANSMITTER
35
300
TRAFFIC INFORMATION MEASUREMENT APPARATUS
10
SENSOR PROCESSOR A
11
SENSOR PROCESSOR B
12
SENSOR PROCESSOR C
13
TRAFFIC INFORMATION CALCULATOR
14
SENSOR A(ULTRASONIC VEHICLE SENSOR)
21
SENSOR B(IMAGE SENSOR)
22
SENSOR C(PROBE CAR)
23

FIG.17

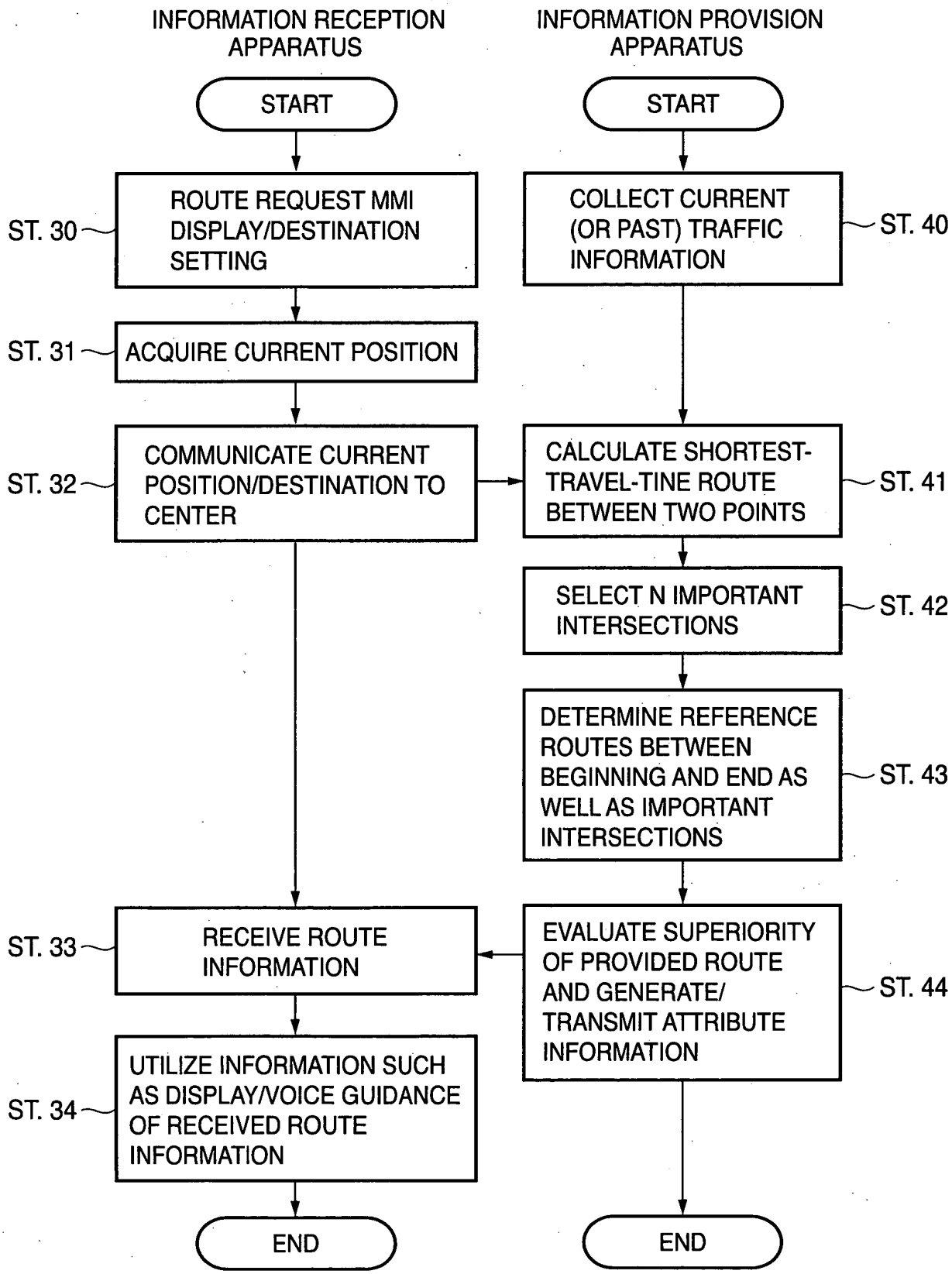
INFORMATION RECEPTION APPARATUS
INFORMATION PROVISION APPARATUS
START
START
ST. 30
ROUTE REQUEST MMI DISPLAY/DESTINATION SETTING
COLLECT CURRENT (OR PAST) TRAFFIC INFORMATION
ST. 40
ST. 31
ACQUIRE CURRENT POSITION
ST. 32
COMMUNICATE CURRENT POSITION/DESTINATION TO CENTER
CALCULATE SHORTEST-TRAVEL-TINE ROUTE BETWEEN TWO POINTS
ST. 41
SELECT N IMPORTANT INTERSECTIONS
ST. 42
DETERMINE REFERENCE ROUTES BETWEEN BEGINNING AND END AS WELL AS IMPORTANT INTERSECTIONS
ST. 43
ST. 33
RECEIVE ROUTE INFORMATION
EVALUATE SUPERIORITY OF PROVIDED ROUTE AND GENERATE/ TRANSMIT ATTRIBUTE INFORMATION
ST. 44
ST. 34
UTILIZE INFORMATION SUCH AS DISPLAY/VOICE GUIDANCE OF RECEIVED ROUTE INFORMATION
END
END

FIG. 18 (a)

HEADER INFORMATION	
TRAVEL TIME ON THE ROUTE	
TOTAL ROUTE LENGTH	
ENCODING PARAMETER INFORMATION	
ACCURACY INFORMATION OF MAP DATA AT SHAPE SOURCE	
BEGINNING NODE PS X DIRECTION ABSOLUTE COORDINATE(LONGITUDE)	
BEGINNING NODE PS Y DIRECTION ABSOLUTE COORDINATE(LATITUDE)	
BEGINNING NODE PS ABSOLUTE BEARING	
PS POSITION ERROR(m)	PS BEARING ERROR(*)
MAXIMUM POSITION ERROR OF ENCODED SHAPE DATA(m)	MAXIMUM BEARING ERROR OF ENCODED SHAPE DATA(*)
ENCODED SHAPE DATA OF ROUTE INCLUDES THE FOLLOWING INFORMATION ·RESAMPLE SECTION LENGTH CODE (CODE+SECTION NUMBER) ·ROAD ATTRIBUTE CODE (CODE+ATTRIBUTE VALUE) ·EOD CODE	

FIG. 18 (b)

HEADER INFORMATION
NO. OF SAMPLING POINTS OF GRAY SCALE INFORMATION
ENCODING PARAMETER INFORMATION OF GRAY SCALE ATTRIBUTE INFORMATION
GRAY SCALE ATTRIBUTE INFORMATION (INCLUDING VARIABLE-LENGTH ENCODING INFORMATION SUCH AS MH ENCODING)

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FIG. 19

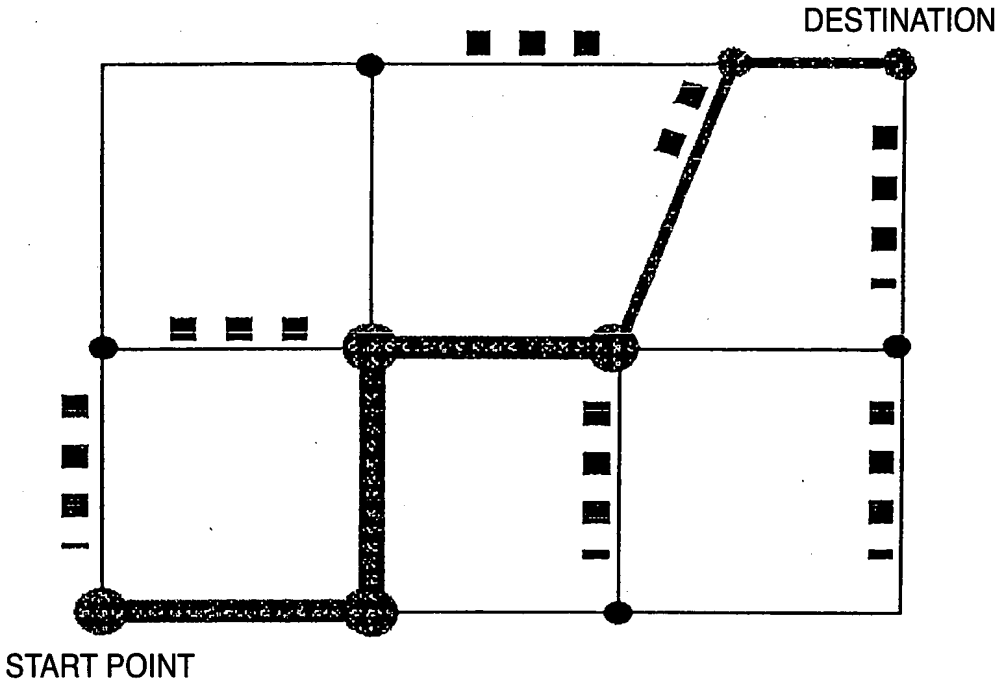

FIG.20

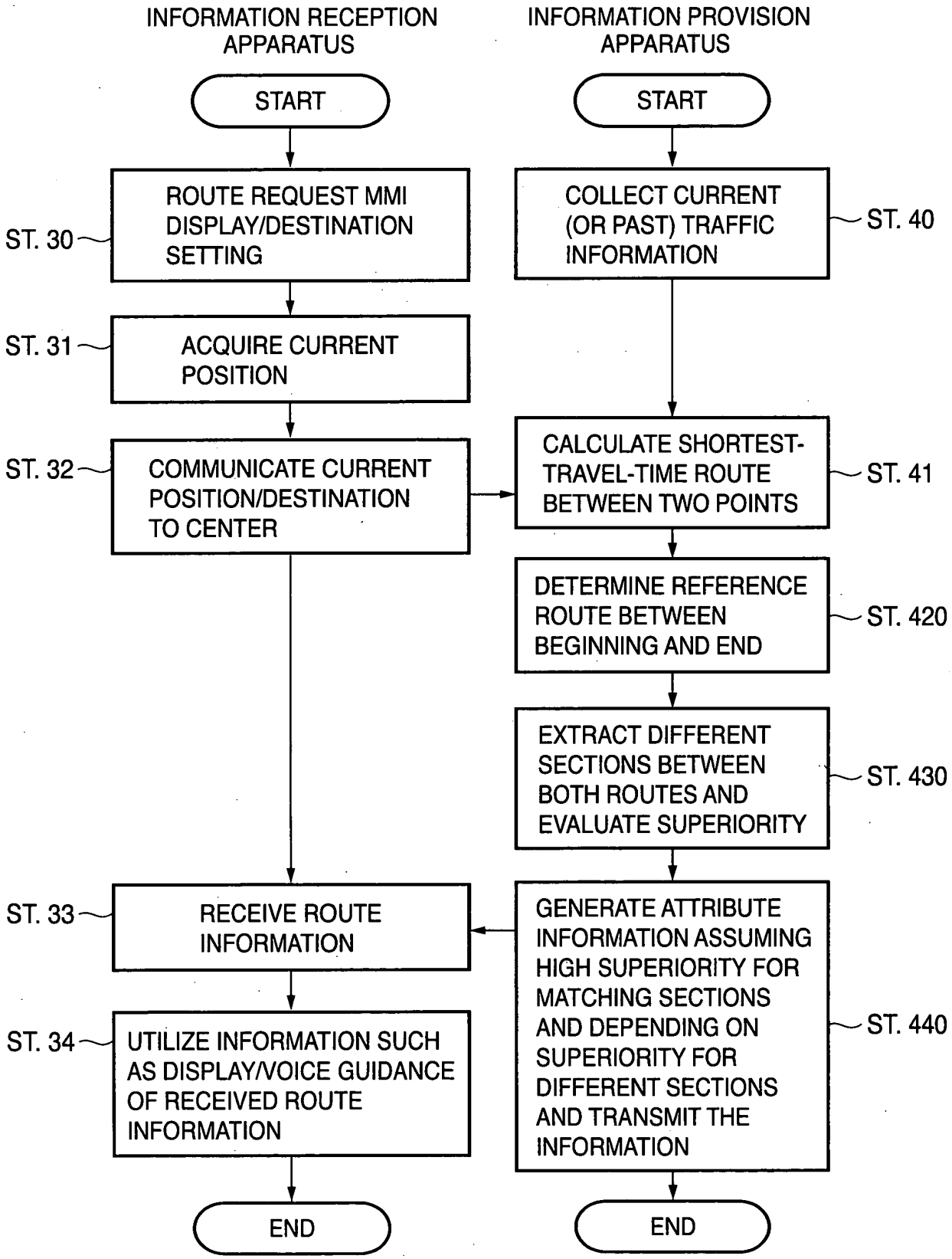
INFORMATION RECEPTION APPARATUS
INFORMATION PROVISION APPARATUS
START
START
ROUTE REQUEST MMI DISPLAY/DESTINATION SETTING
ST. 30
COLLECT CURRENT (OR PAST) TRAFFIC INFORMATION
ST. 40
ACQUIRE CURRENT POSITION
ST. 31
COMMUNICATE CURRENT POSITION/DESTINATION TO CENTER
ST. 32
CALCULATE SHORTEST-TRAVEL-TIME ROUTE BETWEEN TWO POINTS
ST. 41
DETERMINE REFERENCE ROUTE BETWEEN BEGINNING AND END
ST. 420
EXTRACT DIFFERENT SECTIONS BETWEEN BOTH ROUTES AND EVALUATE SUPERIORITY
ST. 430
RECEIVE ROUTE INFORMATION
ST. 33
GENERATE ATTRIBUTE INFORMATION ASSUMING HIGH SUPERIORITY FOR MATCHING SECTIONS AND DEPENDING ON SUPERIORITY FOR DIFFERENT SECTIONS AND TRANSMIT THE INFORMATION
ST. 440
UTILIZE INFORMATION SUCH AS DISPLAY/VOICE GUIDANCE OF RECEIVED ROUTE INFORMATION
ST. 34
END
END

FIG. 21

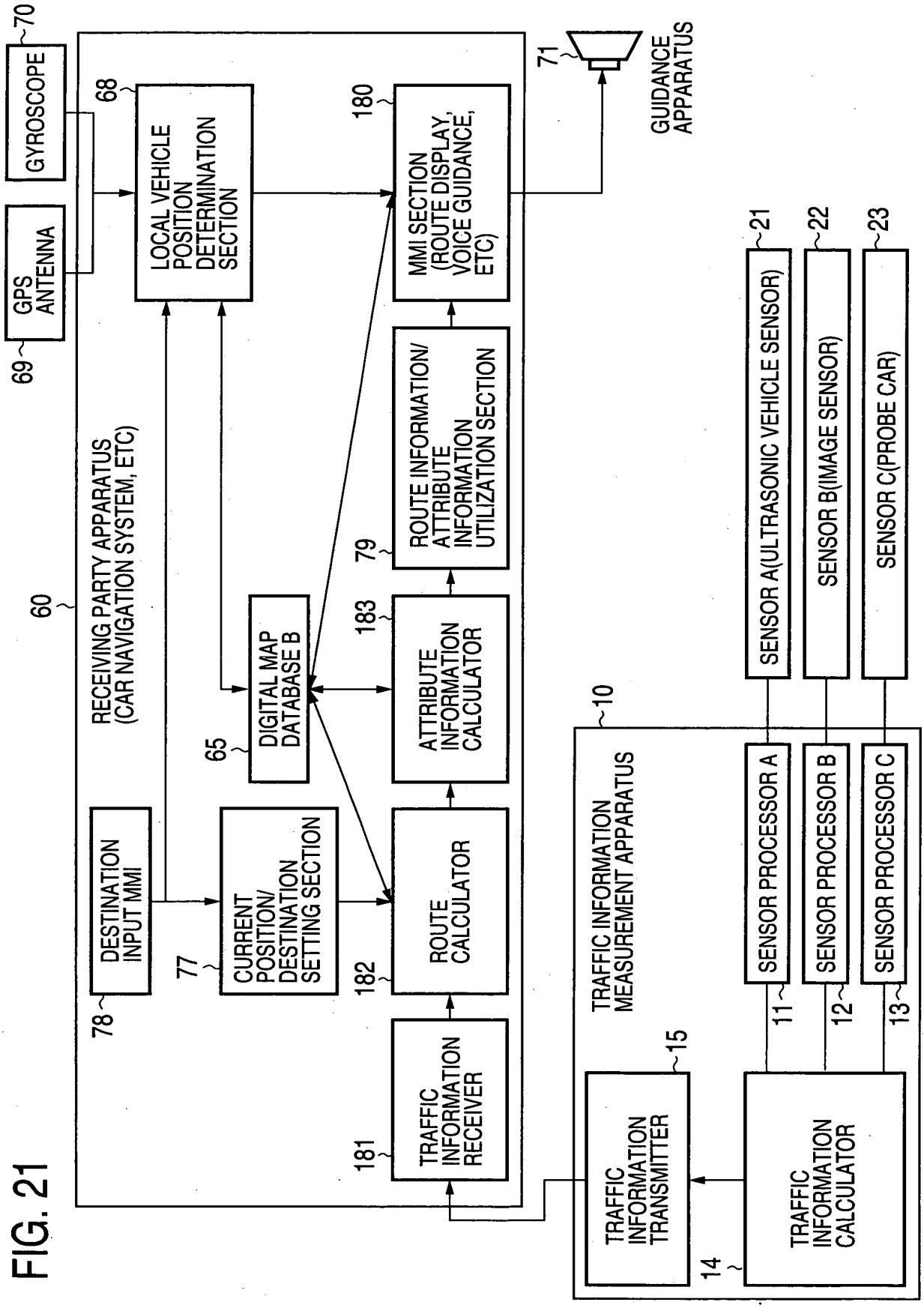
70
GYROSCOPE
68
LOCAL VEHICLE POSITION DETERMINATION SECTION
180
MMI SECTION (ROUTE DISPLAY, VOICE GUIDANCE, ETC)
71
GUIDANCE APPARATUS
69
GPS ANTENNA
60
RECEIVING PARTY APPARATUS (CAR NAVIGATION SYSTEM, ETC)
79
ROUTE INFORMATION/ ATTRIBUTE INFORMATION UTILIZATION SECTION
183
ATTRIBUTE INFORMATION CALCULATOR
65
DIGITAL MAP DATABASE B
77
CURRENT POSITION/ DESTINATION SETTING SECTION
78
DESTINATION INPUT MMI
182
ROUTE CALCULATOR
181
TRAFFIC INFORMATION RECEIVER
10
TRAFFIC INFORMATION MEASUREMENT APPARATUS
21
SENSOR A(ULTRASONIC VEHICLE SENSOR)
22
SENSOR B(IMAGE SENSOR)
23
SENSOR C(PROBE CAR)
11
SENSOR PROCESSOR A
12
SENSOR PROCESSOR B
13
SENSOR PROCESSOR C
15
TRAFFIC INFORMATION TRANSMITTER
14
TRAFFIC INFORMATION CALCULATOR

FIG.22

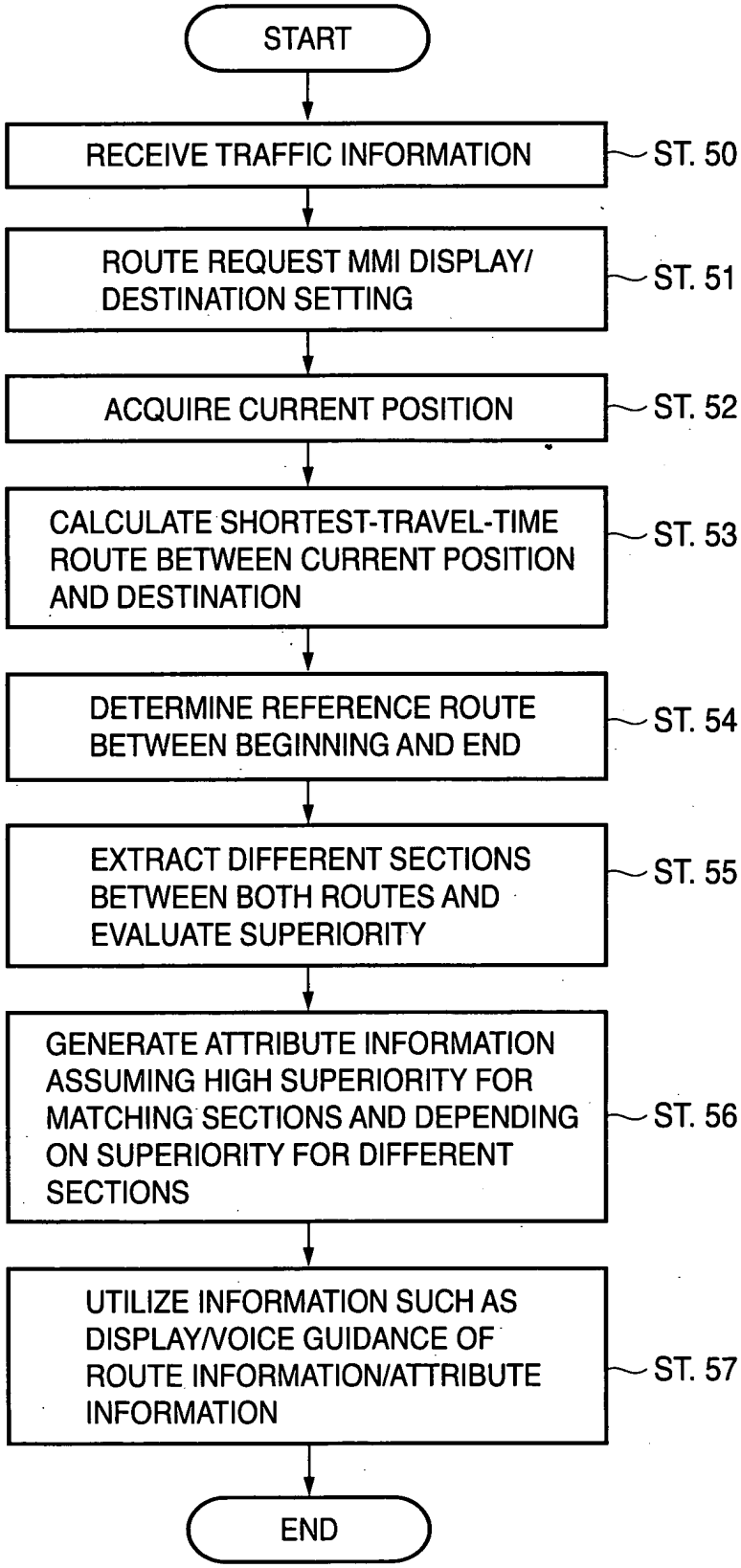
START
RECEIVE TRAFFIC INFORMATION
ST. 50
ROUTE REQUEST MMI DISPLAY/ DESTINATION SETTING
ST. 51
ACQUIRE CURRENT POSITION
ST. 52
CALCULATE SHORTEST-TRAVEL-TIME ROUTE BETWEEN CURRENT POSITION AND DESTINATION
ST. 53
DETERMINE REFERENCE ROUTE BETWEEN BEGINNING AND END
ST. 54
EXTRACT DIFFERENT SECTIONS BETWEEN BOTH ROUTES AND EVALUATE SUPERIORITY
ST. 55
GENERATE ATTRIBUTE INFORMATION ASSUMING HIGH SUPERIORITY FOR MATCHING SECTIONS AND DEPENDING ON SUPERIORITY FOR DIFFERENT SECTIONS
ST. 56
UTILIZE INFORMATION SUCH AS DISPLAY/VOICE GUIDANCE OF ROUTE INFORMATION/ATTRIBUTE INFORMATION
ST. 57
END

FIG.23(a)

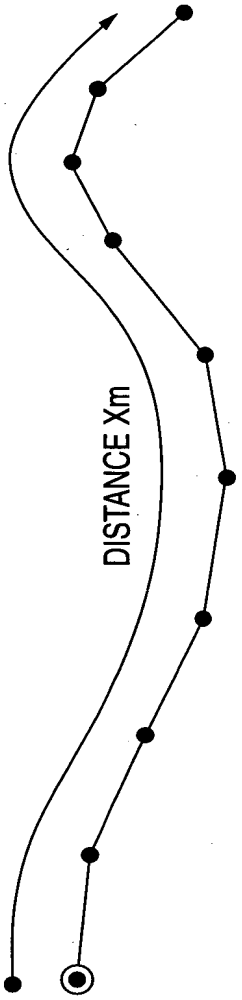

FIG.23(b)

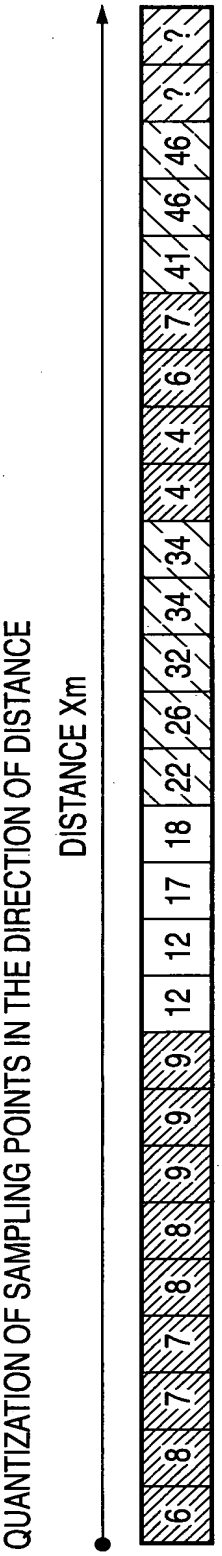

FIG. 24 (a)

HEADER INFORMATION	
NO. OF SHAPE VECTORS N	
SHAPE VECTOR DATA IDENTIFICATION NUMBER=1	
ENCODING TABLE IDENTIFICATION CODE	
ACCURACY INFORMATION OF MAP DATA AT SHAPE SOURCE	
DIRECTION OF ONE-WAY TRAFFIC(FORWARD/BACKWARD/NONE)	
BEGINNING NODE NUMBER PS	
NODE PS X DIRECTION ABSOLUTE COORDINATE(LONGITUDE)	
NODE PS Y DIRECTION ABSOLUTE COORDINATE(LATITUDE)	
NODE PS Y ABSOLUTE BEARING	
PS POSITION ERROR(m)	PS BEARING ERROR(*)
MAXIMUM POSITION ERROR OF ENCODED SHAPE DATA(m)	MAXIMUM BEARING ERROR OF ENCODED SHAPE DATA(*)
ENCODED SHAPE DATA INCLUDES THE FOLLOWING INFORMATION ·REFERENCE NODE SETTING CODE ·SECTION LENGTH CHANGE CODE ·EOD CODE	
END NODE NUMBER PE	
NODE PE X DIRECTION RELATIVE COORDINATE(LONGITUDE)	
NODE PE Y DIRECTION RELATIVE COORDINATE(LATITUDE)	
NODE PE Y ABSOLUTE BEARING	
PE POSITION ERROR(m)	PE BEARING ERROR(*)
≀	
SHAPE VECTOR DATA IDENTIFICATION NUMBER=M	
≀	

FIG. 24 (b)

HEADER INFORMATION	
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS V	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE VECTOR STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG(FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
DISTANCE DIRECTION QUANTIZED SECTION LENGTH IDENTIFICATION CODE	
ENCODING SYSTEM IDENTIFICATION CODE(DCT, DWT, ETC)	
NO. OF QUANTIZED UNIT SECTIONS	
TRAFFIC INFORMATION (VARIABLE-LENGTH ENCODING INFORMATION ENCODED USING IRREVERSIBLE COMPRESSION SYSTEM SUCH AS DCT AND DWT)	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=2	
≀	

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FIG.25(a)

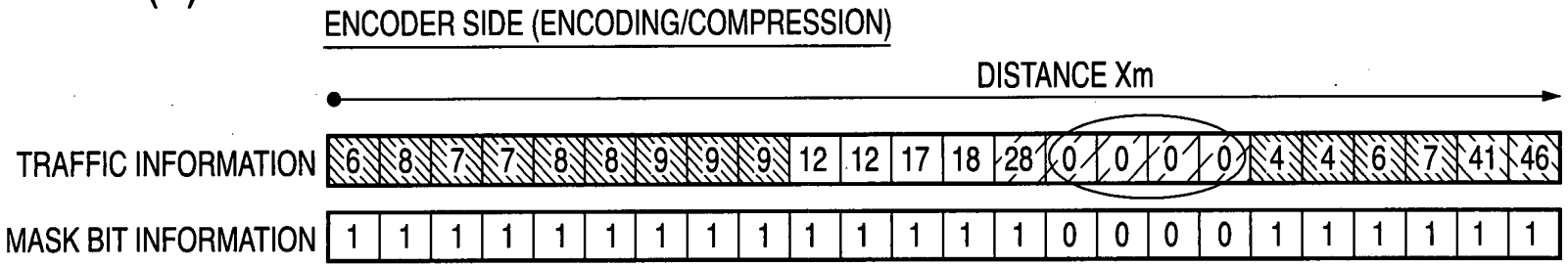

FIG.25(b)

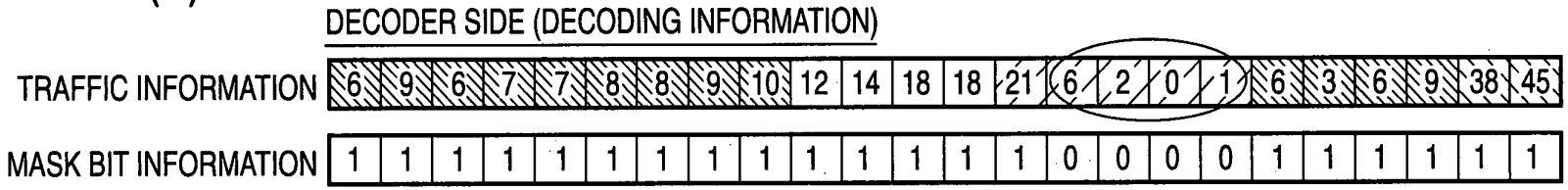

FIG.25(c)

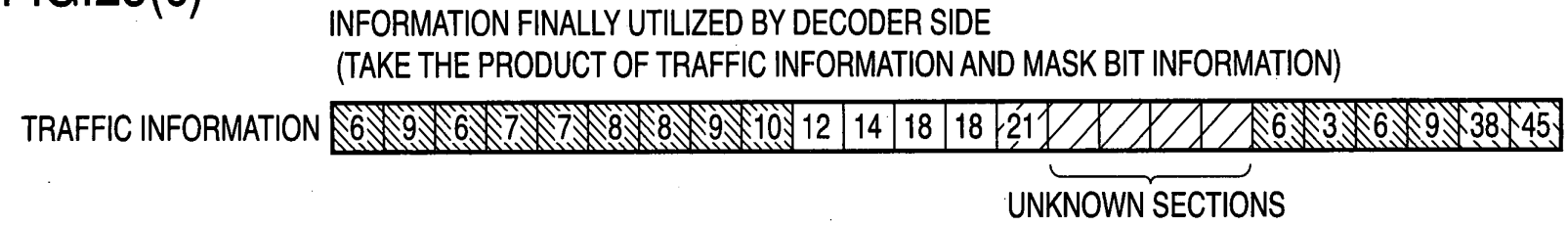

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FIG. 26

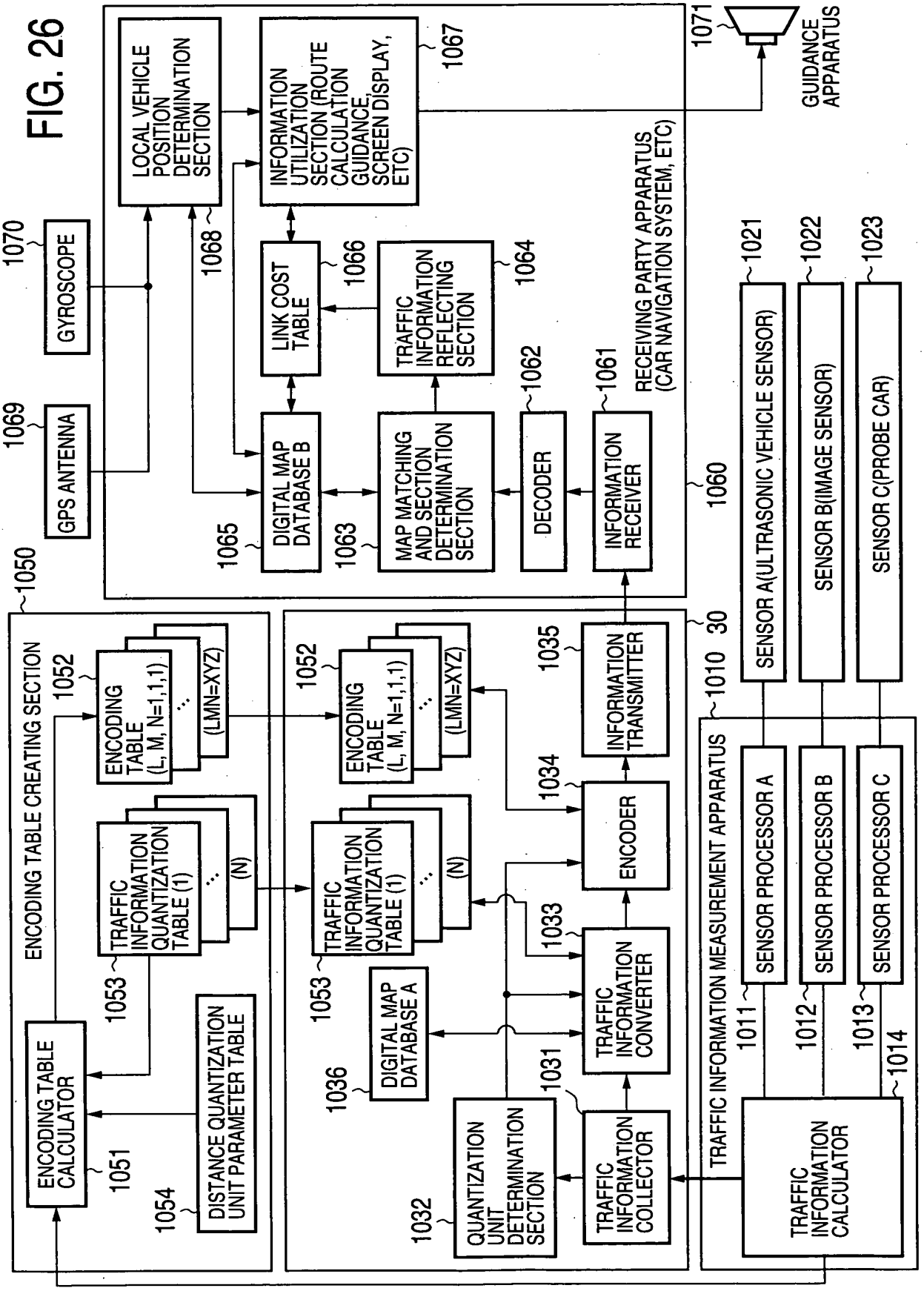
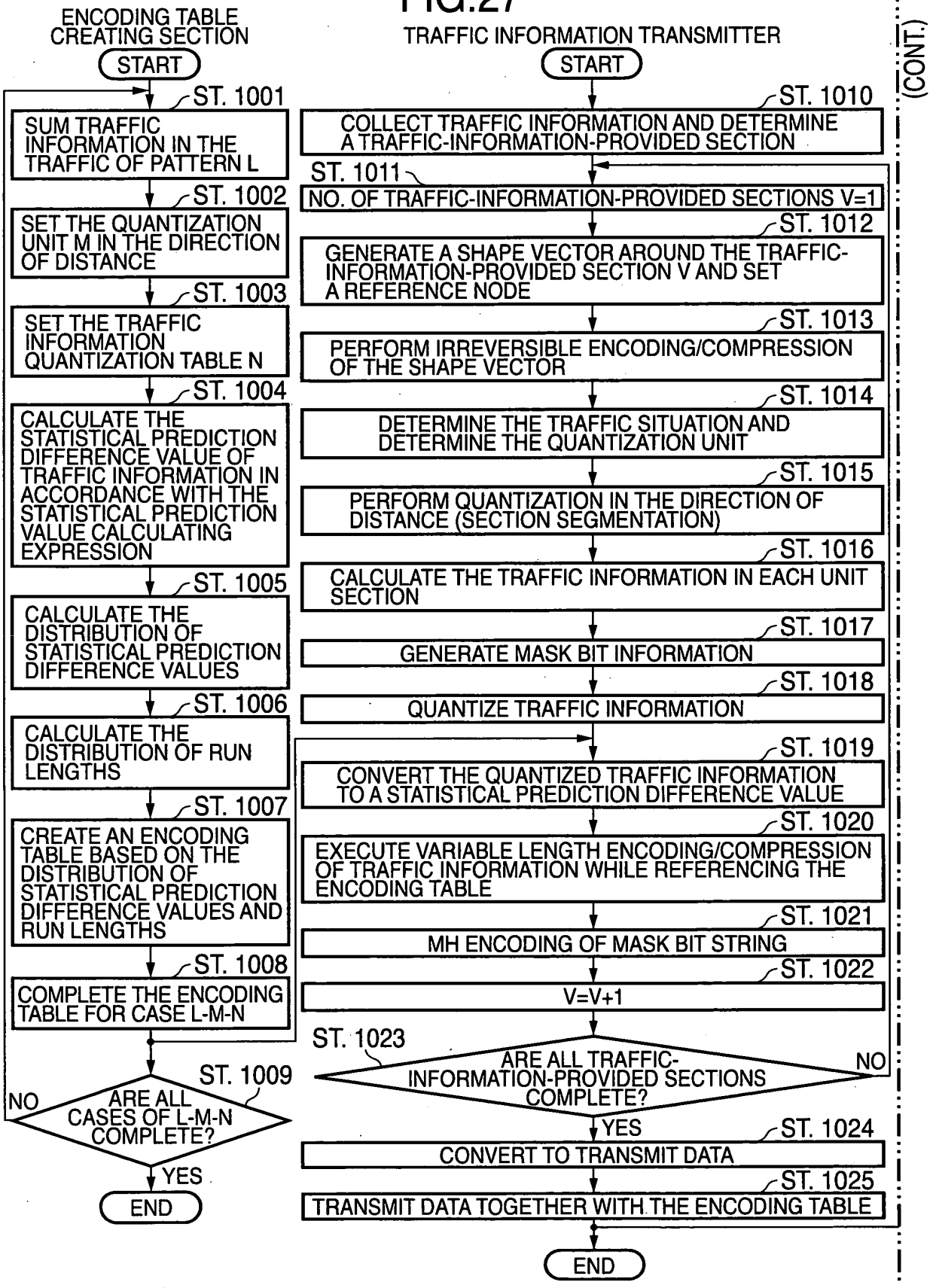

ENCODING TABLE CREATING SECTION
1050
ENCODING TABLE CALCULATOR
1051
DISTANCE QUANTIZATION UNIT PARAMETER TABLE
1054
TRAFFIC INFORMATION QUANTIZATION TABLE (1)
(N)
1053
ENCODING TABLE (L, M, N=1,1,1)
(LMN=XYZ)
1052
RECEIVING PARTY APPARATUS (CAR NAVIGATION SYSTEM, ETC)
1060
GPS ANTENNA
1069
GYROSCOPE
1070
LOCAL VEHICLE POSITION DETERMINATION SECTION
1068
DIGITAL MAP DATABASE B
1065
MAP MATCHING AND SECTION DETERMINATION SECTION
1063
DECODER
1062
INFORMATION RECEIVER
1061
LINK COST TABLE
1066
TRAFFIC INFORMATION REFLECTING SECTION
1064
INFORMATION UTILIZATION SECTION (ROUTE CALCULATION GUIDANCE, SCREEN DISPLAY, ETC)
1067
GUIDANCE APPARATUS
1071
30
QUANTIZATION UNIT DETERMINATION SECTION
1032
TRAFFIC INFORMATION COLLECTOR
1031
TRAFFIC INFORMATION CONVERTER
1033
ENCODER
1034
INFORMATION TRANSMITTER
1035
DIGITAL MAP DATABASE A
1036
TRAFFIC INFORMATION MEASUREMENT APPARATUS
1010
TRAFFIC INFORMATION CALCULATOR
1014
SENSOR PROCESSOR A
1011
SENSOR PROCESSOR B
1012
SENSOR PROCESSOR C
1013
SENSOR A(ULTRASONIC VEHICLE SENSOR)
1021
SENSOR B(IMAGE SENSOR)
1022
SENSOR C(PROBE CAR)
1023

FIG.27


ENCODING TABLE CREATING SECTION
START
ST. 1001
SUM TRAFFIC INFORMATION IN THE TRAFFIC OF PATTERN L
ST. 1002
SET THE QUANTIZATION UNIT M IN THE DIRECTION OF DISTANCE
ST. 1003
SET THE TRAFFIC INFORMATION QUANTIZATION TABLE N
ST. 1004
CALCULATE THE STATISTICAL PREDICTION DIFFERENCE VALUE OF TRAFFIC INFORMATION IN ACCORDANCE WITH THE STATISTICAL PREDICTION VALUE CALCULATING EXPRESSION
ST. 1005
CALCULATE THE DISTRIBUTION OF STATISTICAL PREDICTION DIFFERENCE VALUES
ST. 1006
CALCULATE THE DISTRIBUTION OF RUN LENGTHS
ST. 1007
CREATE AN ENCODING TABLE BASED ON THE DISTRIBUTION OF STATISTICAL PREDICTION DIFFERENCE VALUES AND RUN LENGTHS
ST. 1008
COMPLETE THE ENCODING TABLE FOR CASE L-M-N
ST. 1009
ARE ALL CASES OF L-M-N COMPLETE?
NO
YES
END
TRAFFIC INFORMATION TRANSMITTER
START
ST. 1010
COLLECT TRAFFIC INFORMATION AND DETERMINE A TRAFFIC-INFORMATION-PROVIDED SECTION
ST. 1011
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS V=1
ST. 1012
GENERATE A SHAPE VECTOR AROUND THE TRAFFIC-INFORMATION-PROVIDED SECTION V AND SET A REFERENCE NODE
ST. 1013
PERFORM IRREVERSIBLE ENCODING/COMPRESSION OF THE SHAPE VECTOR
ST. 1014
DETERMINE THE TRAFFIC SITUATION AND DETERMINE THE QUANTIZATION UNIT
ST. 1015
PERFORM QUANTIZATION IN THE DIRECTION OF DISTANCE (SECTION SEGMENTATION)
ST. 1016
CALCULATE THE TRAFFIC INFORMATION IN EACH UNIT SECTION
ST. 1017
GENERATE MASK BIT INFORMATION
ST. 1018
QUANTIZE TRAFFIC INFORMATION
ST. 1019
CONVERT THE QUANTIZED TRAFFIC INFORMATION TO A STATISTICAL PREDICTION DIFFERENCE VALUE
ST. 1020
EXECUTE VARIABLE LENGTH ENCODING/COMPRESSION OF TRAFFIC INFORMATION WHILE REFERENCING THE ENCODING TABLE
ST. 1021
MH ENCODING OF MASK BIT STRING
ST. 1022
V=V+1
ST. 1023
ARE ALL TRAFFIC-INFORMATION-PROVIDED SECTIONS COMPLETE?
NO
YES
ST. 1024
CONVERT TO TRANSMIT DATA
ST. 1025
TRANSMIT DATA TOGETHER WITH THE ENCODING TABLE
END
(CONT.)

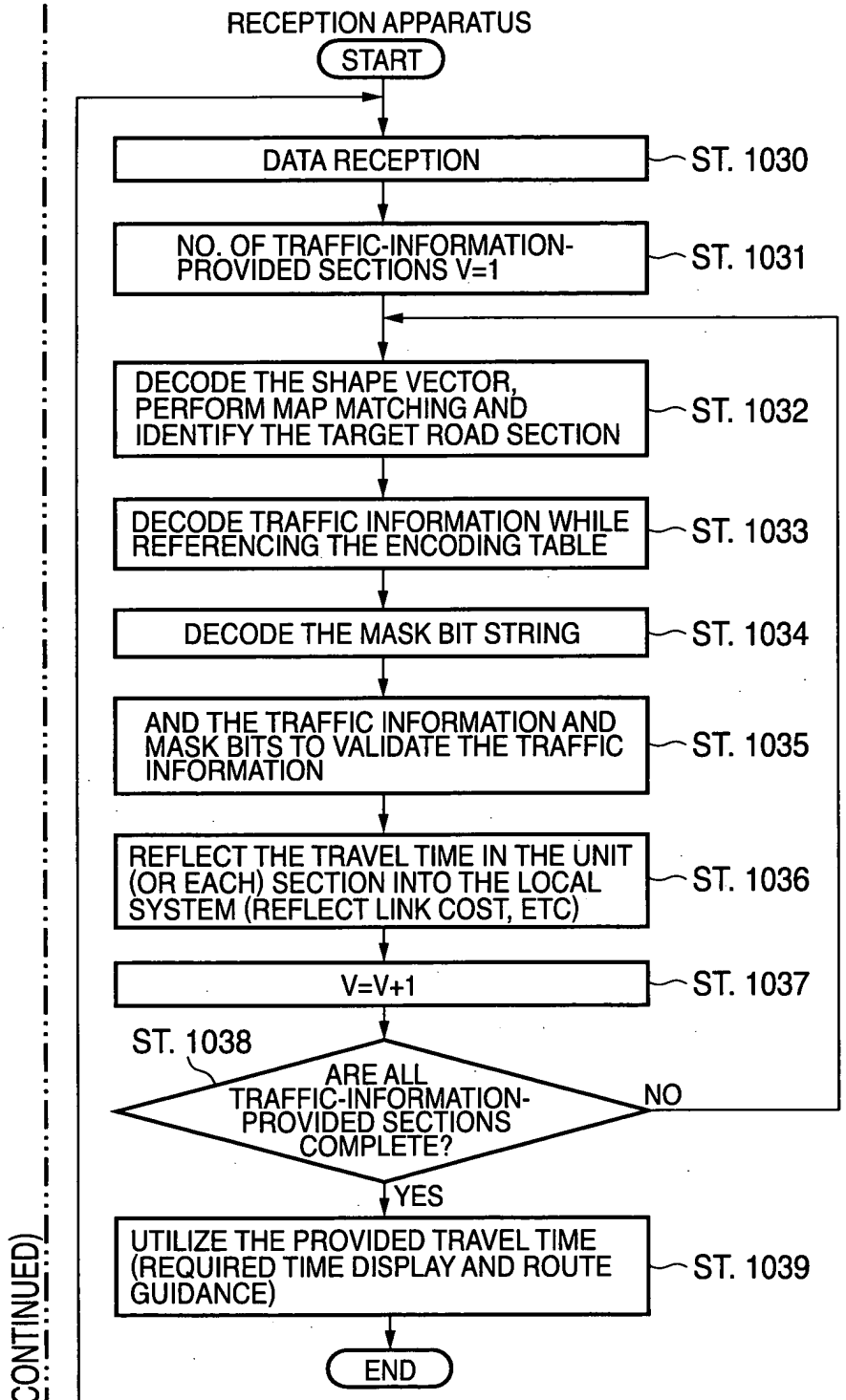
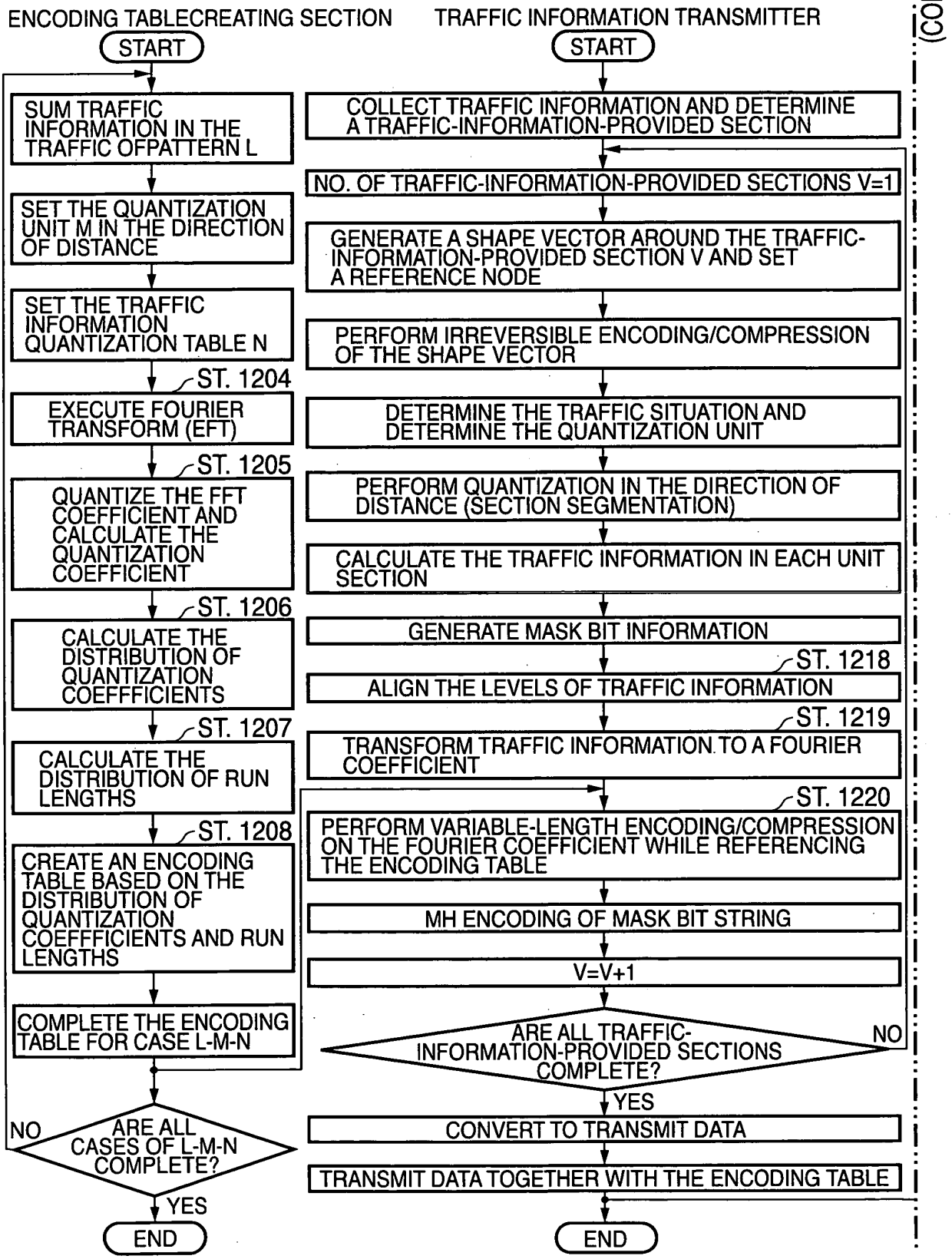

RECEPTION APPARATUS
START
DATA RECEPTION
ST. 1030
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS V=1
ST. 1031
DECODE THE SHAPE VECTOR, PERFORM MAP MATCHING AND IDENTIFY THE TARGET ROAD SECTION
ST. 1032
DECODE TRAFFIC INFORMATION WHILE REFERENCING THE ENCODING TABLE
ST. 1033
DECODE THE MASK BIT STRING
ST. 1034
AND THE TRAFFIC INFORMATION AND MASK BITS TO VALIDATE THE TRAFFIC INFORMATION
ST. 1035
REFLECT THE TRAVEL TIME IN THE UNIT (OR EACH) SECTION INTO THE LOCAL SYSTEM (REFLECT LINK COST, ETC)
ST. 1036
V=V+1
ST. 1037
ST. 1038
ARE ALL TRAFFIC-INFORMATION-PROVIDED SECTIONS COMPLETE?
NO
YES
UTILIZE THE PROVIDED TRAVEL TIME (REQUIRED TIME DISPLAY AND ROUTE GUIDANCE)
ST. 1039
END
(FIG. 27 CONTINUED)

FIG.28

WITH RESPECT TO A STEP TO WHICH NO STEP NO. IS ASSIGNED, PLEASE REFER TO FIG. 27



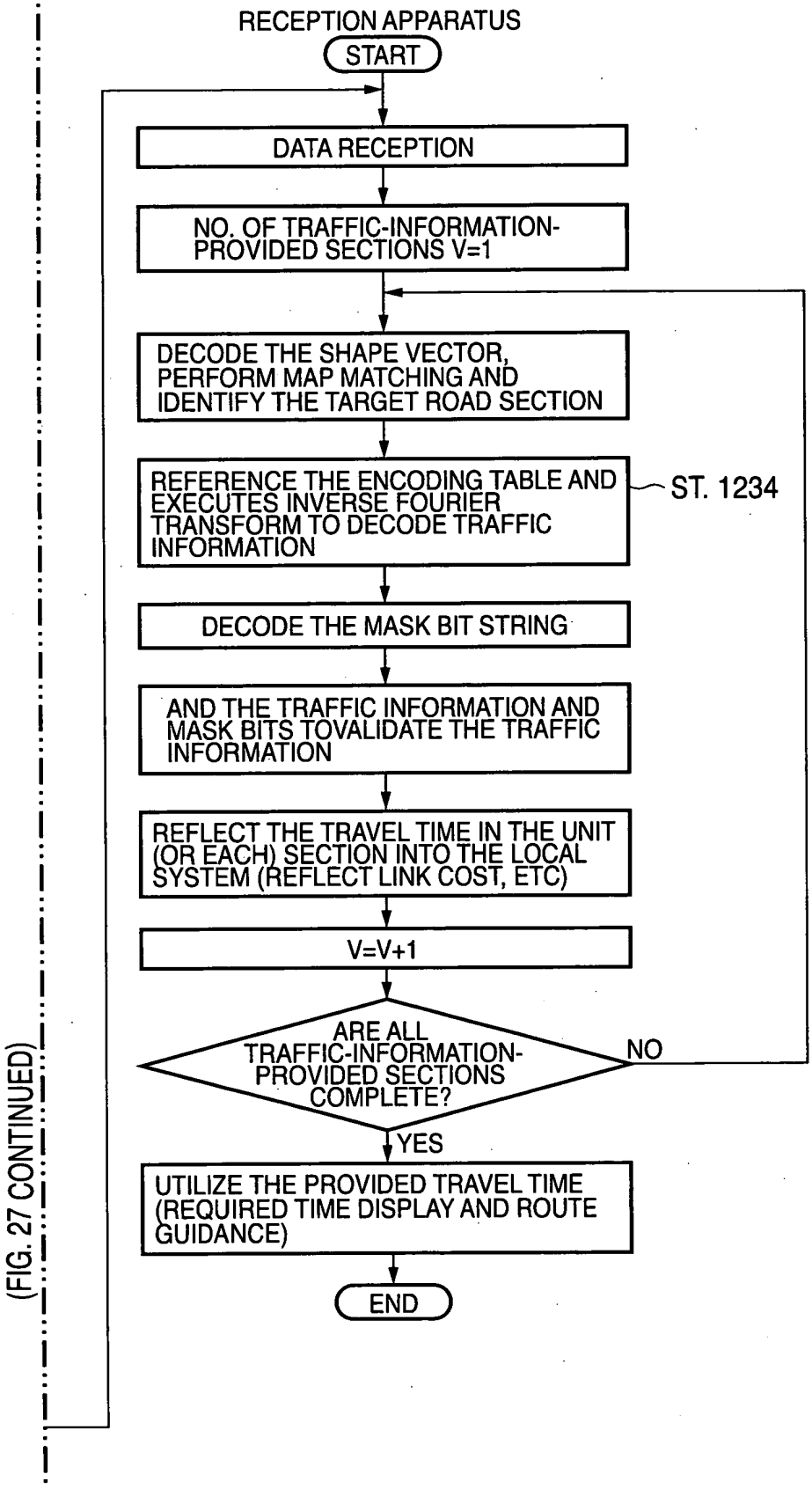

RECEPTION APPARATUS
START
DATA RECEPTION
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS V=1
DECODE THE SHAPE VECTOR, PERFORM MAP MATCHING AND IDENTIFY THE TARGET ROAD SECTION
REFERENCE THE ENCODING TABLE AND EXECUTES INVERSE FOURIER TRANSFORM TO DECODE TRAFFIC INFORMATION
ST. 1234
DECODE THE MASK BIT STRING
AND THE TRAFFIC INFORMATION AND MASK BITS TOVALIDATE THE TRAFFIC INFORMATION
REFLECT THE TRAVEL TIME IN THE UNIT (OR EACH) SECTION INTO THE LOCAL SYSTEM (REFLECT LINK COST, ETC)
V=V+1
ARE ALL TRAFFIC-INFORMATION-PROVIDED SECTIONS COMPLETE?
NO
YES
UTILIZE THE PROVIDED TRAVEL TIME (REQUIRED TIME DISPLAY AND ROUTE GUIDANCE)
END
(FIG. 27 CONTINUED)

FIG. 29

HEADER INFORMATION	
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS V	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE VECTOR STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG(FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
DISTANCE DIRECTION QUANTIZED SECTION LENGTH IDENTIFICATION CODE	
ENCODING SYSTEM IDENTIFICATION CODE(DCT, DWT, ETC)	
ENCODING TABLE IDENTIFICATION CODE	
NO. OF QUANTIZED UNIT SECTIONS	
MASK BIT INFORMATION (INCLUDING VARIABLE-LENGTH ENCODING INFORMATION SUCH AS MH ENCODING)	
TRAFFIC INFORMATION (VARIABLE-LENGTH ENCODING INFORMATION ENCODED USING IRREVERSIBLE COMPRESSION SYSTEM SUCH AS DCT AND DWT)	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=2	
↓	

FIG. 30A

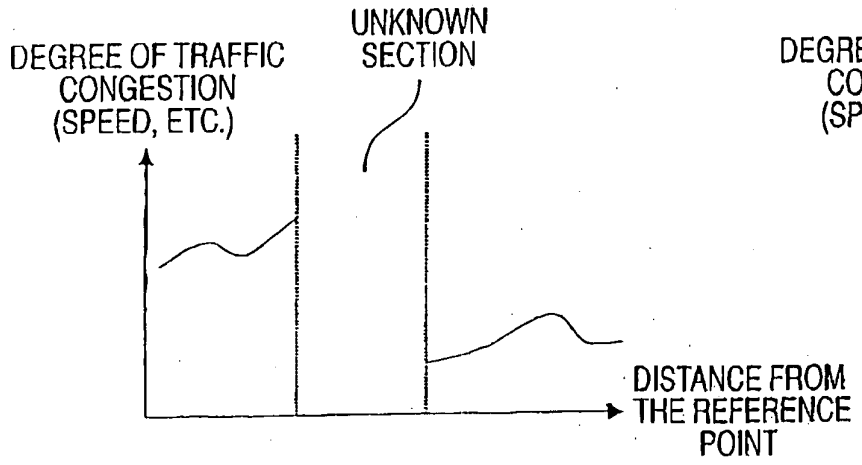


FIG. 30B

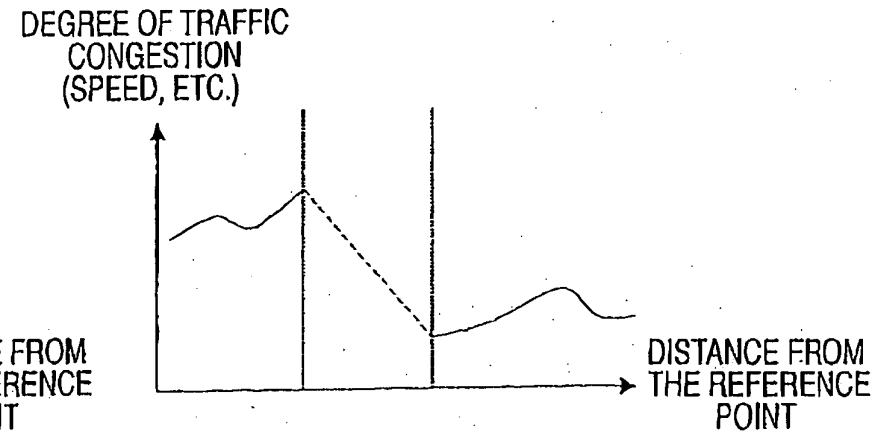


FIG. 30C

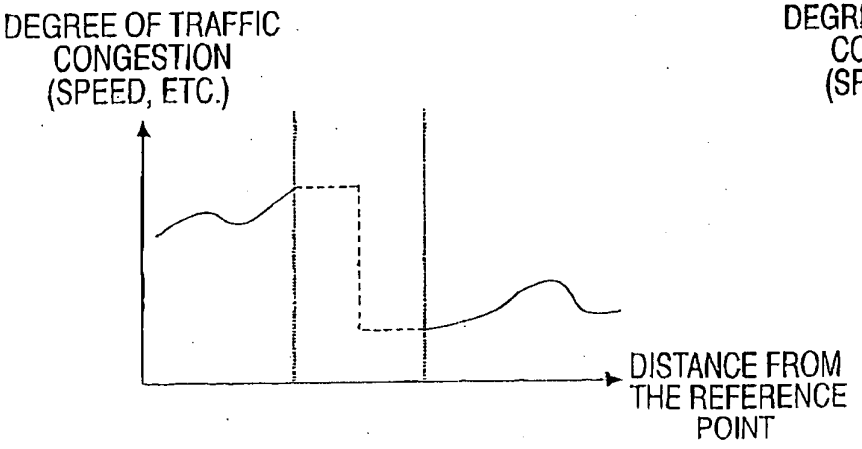


FIG. 30D

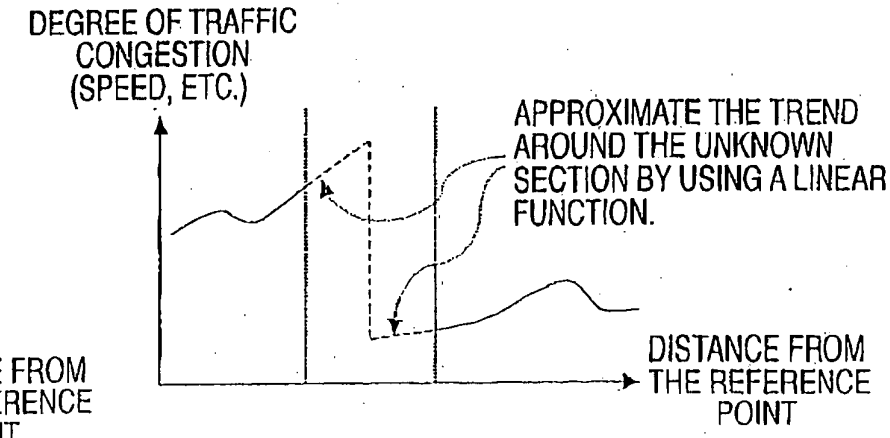


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FIG. 31(a)

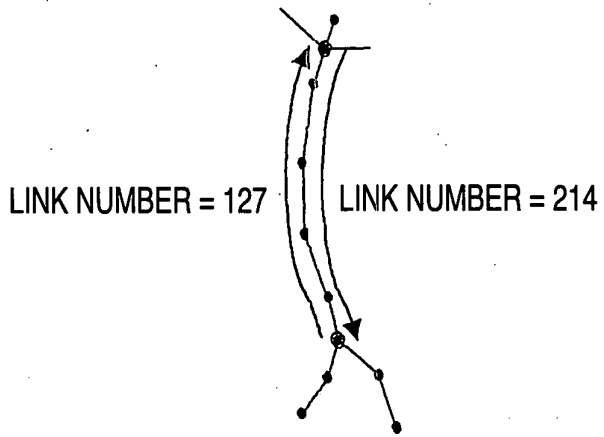

FIG. 31(b)

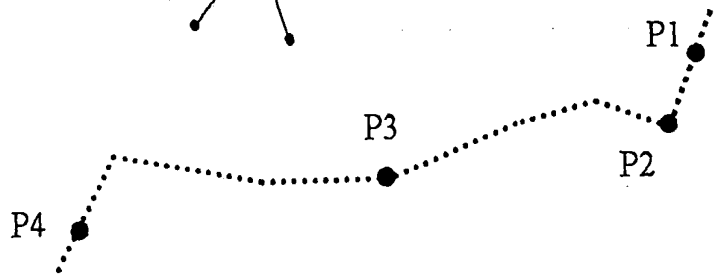

FIG. 31(c)

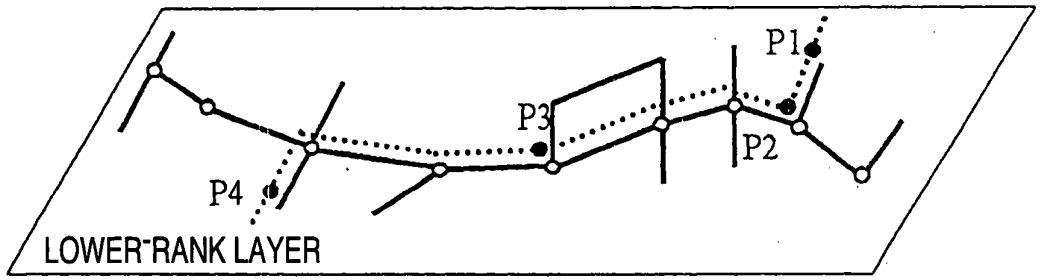

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FIG. 32

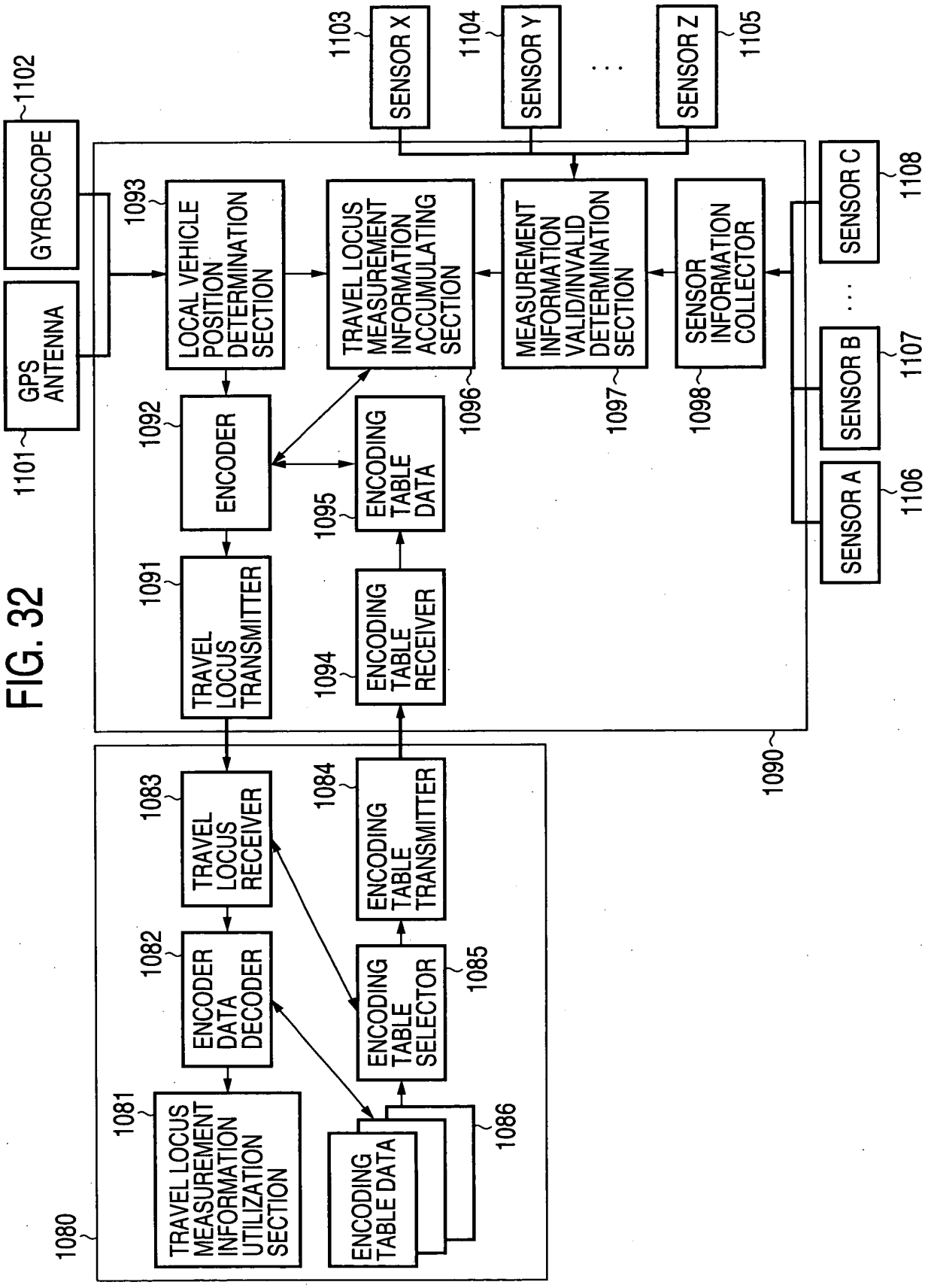
1102
GYROSCOPE
1101
GPS ANTENNA
1103
SENSOR X
1104
SENSOR Y
1105
SENSOR Z
1108
SENSOR C
1107
SENSOR B
1106
SENSOR A
1093
LOCAL VEHICLE POSITION DETERMINATION SECTION
TRAVEL LOCUS MEASUREMENT INFORMATION ACCUMULATING SECTION
1096
MEASUREMENT INFORMATION VALID/INVALID DETERMINATION SECTION
1097
SENSOR INFORMATION COLLECTOR
1098
1092
ENCODER
1095
ENCODING TABLE DATA
1091
TRAVEL LOCUS TRANSMITTER
1094
ENCODING TABLE RECEIVER
1090
1083
TRAVEL LOCUS RECEIVER
1084
ENCODING TABLE TRANSMITTER
1082
ENCODER DATA DECODER
1085
ENCODING TABLE SELECTOR
1081
TRAVEL LOCUS MEASUREMENT INFORMATION UTILIZATION SECTION
1086
ENCODING TABLE DATA
1080

FIG. 33

<table>
<tr><td colspan="2">ID INFORMATION</td></tr>
<tr><td colspan="2">IDENTIFICATION NUMBER OF THE ENCODING TABLE IN USE</td></tr>
<tr><td colspan="2">TIME OF MEASUREMENT OF FINAL MEASUREMENT POINT(POSITION/SPEED)</td></tr>
<tr><td colspan="2">SAMPLING DISTANCE INTERVAL OF POSITION INFORMATION</td></tr>
<tr><td colspan="2">SAMPLING DISTANCE INTERVAL OF SPEED INFORMATION</td></tr>
<tr><td colspan="2">NO. OF SAMPLING POINTS OF SPEED INFORMATION</td></tr>
<tr><td colspan="2">NO. OF SAMPLING POINTS OF POSITION INFORMATION</td></tr>
<tr><td>ABSOLUTE LONGITUDE OF FINAL MEASUREMENT POINT</td><td>ABSOLUTE LATITUDE OF FINAL MEASUREMENT POINT</td></tr>
<tr><td>ABSOLUTE BEARING BETWEEN FINAL POINT AND PREVIOUS POINT</td><td>DISTANCE BETWEEN FINAL POINT AND PREVIOUS POINT</td></tr>
<tr><td colspan="2">ENCODED DATA OF TRAVEL LOCUS
(BIT STRING OBTAINED BY ENCODING θ, $\Delta\theta j$)</td></tr>
<tr><td colspan="2">ENCODED DATA OF MEASUREMENT INFORMATION SUCH AS SPEED
(BIT STRING OBTAINED BY ENCODING A DIFFERENCE FROM PRECEDING SECTION OR FREQUENCY CONVERTED VALUE)</td></tr>
<tr><td colspan="2">ENCODING INFORMATION OF MASK BIT STRING INDICATING THAT SPEED INFORMATION IS VALID OR INVALID</td></tr>
</table>

FIG.34(a)

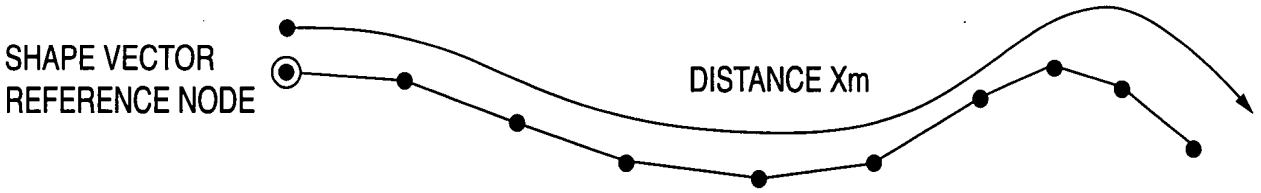

FIG.34(b)

QUANTIZATION OF SAMPLING POINTS IN THE DIRECTION OF DISTANCE

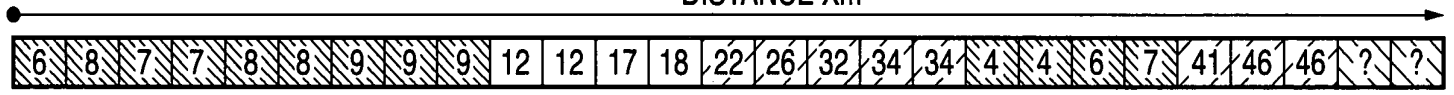

FIG.34(c)

QUANTIZATION OF TRAFFIC INFORMATION (SPEED)

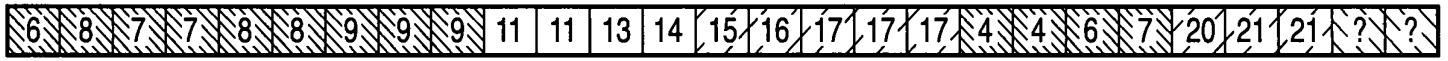

FIG.34(d)

REPRESENTATION OF DIFFERENCE FROM STATISTICAL PREDICTION VALUE

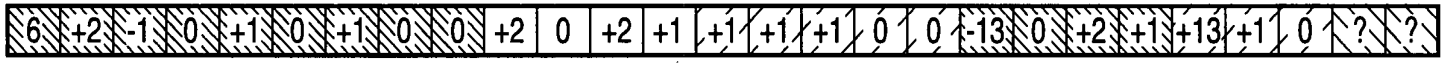

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FIG. 35

QUANTIZATION VOLUME	SPEED(km/h)
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10~11
11	12~13
12	14~15
13	16~17
14	18~19
15	20~24
16	25~29
17	30~34
18	35~39
19	40~44
20	45~49
21	50~59
22	60~69
23	70~79
24	80~99
30	200 OR MORE

FIG. 36

SPECIAL CODE		CODE	ADDITIONAL BIT	
SECTION LENGTH CHANGE CODE				
TRAFFIC INFORMATION QUANTIZATION TABLE CHANGE CODE			4(TABLE NUMBER)	
IDENTIFICATION CODE FOR A POINT CORRESPONDING TO REFERENCE NODE			(CORRESPONDING REFERENCE NODE NUMBER)+8(OFFSET DISTANCE FROM REFERENCE NODE)	
ENCODING TABLE FOR STATISTICAL PREDICTION DIFFERENCE VALUES OF TRAFFIC INFORMATION		CODE	ADDITIONAL BIT I	ADDITIONAL BIT II (RANGE)
RUN LENGTH	CHANGE VOLUME			
0	0	0	0	-
5	0	100	0	-
10	0	1101	0	-
0	1	1110	1(*IDENTIFICATION)	0
0	2	111100	1(*IDENTIFICATION)	0
0	4	111101	1(*IDENTIFICATION)	1(3 OR 4)

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FIG. 37 (a)

HEADER INFORMATION	
NO. OF SHAPE VECTORS N	
SHAPE VECTOR DATA IDENTIFICATION NUMBER=1	
ENCODING TABLE IDENTIFICATION CODE	
ACCURACY INFORMATION OF MAP DATA AT SHAPE SOURCE	
DIRECTION OF ONE-WAY TRAFFIC(FORWARD/BACKWARD/NONE)	
BEGINNING NODE NUMBER PS	
NODE PS X DIRECTION ABSOLUTE COORDINATE(LONGITUDE)	
NODE PS Y DIRECTION ABSOLUTE COORDINATE(LATITUDE)	
NODE PS Y ABSOLUTE BEARING	
PS POSITION ERROR(m)	PS BEARING ERROR(*)
MAXIMUM POSITION ERROR OF ENCODED SHAPE DATA(m)	MAXIMUM BEARING ERROR OF ENCODED SHAPE DATA(*)
ENCODED SHAPE DATA INCLUDES THE FOLLOWING INFORMATION ・REFERENCE NODE SETTING CODE ・SECTION LENGTH CHANGE CODE ・EOD CODE	
END NODE NUMBER PE	
NODE PE X DIRECTION RELATIVE COORDINATE(LONGITUDE)	
NODE PE Y DIRECTION RELATIVE COORDINATE(LATITUDE)	
NODE PE Y ABSOLUTE BEARING	
PE POSITION ERROR(m)	PE BEARING ERROR(*)
≀	
SHAPE VECTOR DATA IDENTIFICATION NUMBER=M	
≀	

FIG. 37 (b)

HEADER INFORMATION	
NO. OF TRAFFIC-INFORMATION-PROVIDED SECTIONS V	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE VECTOR STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG(FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
DISTANCE DIRECTION QUANTIZED SECTION LENGTH IDENTIFICATION CODE	
TRAFFIC INFORMATION QUANTIZATION TABLE IDENTIFICATION CODE	
ENCODING TABLE IDENTIFICATION CODE	
NO. OF QUANTIZED UNIT SECTIONS	
TRAFFIC INFORMATION AT THE BEGINNING(INITIAL VALUE)	
TRAFFIC INFORMATION ENCODED BY THE DIFFERENCE VALUE FROM STATISTICAL PREDICTION VALUE. INCLUDES THE FOLLOWING INFORMATION ・SECTION LENGTH CHANGE CODE AND SECTION LENGTH AFTER CHANGE ・TRAFFIC INFORMATION QUANTIZATION TABLE CHANGE CODE AND TABLE NUMBER AFTER CHANGE ・IDENTIFICATION CODE FOR THE POINT CORRESPONDING TO REFERENCE NODE AND CORRESPONDING REFERENCE NODE NUMBER+OFFSET DISTANCE	
≀	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=W	
≀	

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FIG. 38

HEADER INFORMATION	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER 1	
REFERENCE SHAPE VECTOR STRING NUMBER=N	
DIRECTION IDENTIFICATION FLAG(FORWARD/BACKWARD)	
BEGINNING REFERENCE NODE Pa	END REFERENCE NODE Pb
TRAFFIC INFORMATION QUANTIZATION TABLE IDENTIFICATION CODE	
ENCODING TABLE IDENTIFICATION CODE	
AMOUNT OF SECTION SPLITTING BETWEEN REFERENCE NODES 2^N	
DATA STRING WHERE FOURIER COEFFICIENTS ARE VARIABLE LENGTH ENCODED IN THE ORDER OF REAL PART TO IMAGINARY PART, AND LOW FREQUENCIES TO HIGH FREQUENCIES	
≀	
TRAFFIC-INFORMATION-PROVIDED SECTION SERIAL NUMBER=2	
≀	

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